

PRINTER:

EPSON® MODEL FX-80



TECHNICAL SERVICE DATA FOR YOUR PRINTER

PRELIMINARY SERVICE CHECKS

This data provides the user with a time-saving service tool which is designed for quick isolation and repair of printer malfunctions.

Check all interconnecting cables for good connections and correct hookup before making service checks.

Replacement or repair of the FMBD Board, Filter Board, Control Panel or connectors may be necessary after the malfunction has been isolated.

GENERAL OPERATION

BUZZER TONE CHECKS

Switch Printer On and listen for one of the following patterns of tones: Three short tones and one long tone will indicate an overvoltage detection. Refer to "Power Supply" section of the Troubleshooting guide.

Three short tones repeated twice indicates a Printhead (HD) malfunction. Check to see if the head cable is loose or the Printhead is not seated firmly on the carriage assembly.

Four long tones indicates one or more of the Printhead Driver Transistors (Q6 Thru Q14) is shorted, or Printhead is damaged. Replace and inspect again.

Five short tones repeated five times indicates paper empty signal. If this signal sounds when the Printer is loaded with paper, check to see if paper is inserted correctly between the lever and switch of PE sensor.

DISASSEMBLY INSTRUCTIONS

UPPER CASE REMOVAL

Remove the brown plastic platen cover, the paper separator, the Printer lid, and the ribbon cartridge. Remove the paper feed knob and four screws from cabinet top. Lift cabinet top up and lay it over to the right side being careful not to dislodge the control panel connector.

CONTROL PANEL REMOVAL

Disconnect Connector CN7 from the FMBD board. Release two plastic clips holding Control panel to cabinet top and remove Control panel through cabinet top.

FILTER BOARD REMOVAL

Disconnect Power Transformer Connector CN1 from Filter board. Remove one screw holding board at the center. Re-

move one grounding screw (for AC power cord) from chassis. Lift Filter board and power cord retainer from cabinet bottom.

FMBD BOARD REMOVAL

Disconnect all connectors from FMBD Board. Remove four screws holding FMBD board to cabinet bottom. Release two plastic clips and remove board from cabinet.

PRINTER MECHANISM REMOVAL

Remove seven screws holding Printer Mechanism to cabinet bottom. Disconnect Connectors CN4, CN5 and CN8 from FMBD Board. Lift Printer Mechanism from cabinet bottom.

PRELIMINARY SERVICE CHECKS (Continued)

SERVICE CHECKS

SEE INTERCONNECTING DIAGRAM AND PHOTOS TO MATCH THE NUMBER IN THE CIRCLES WITH THOSE IN THE FOLLOWING DATA FOR SERVICE CHECKS TO BE PERFORMED.

1. PRINTER DEAD

- (A) Check AC Fuse (F1). If Fuse is open, disconnect the power transformer Connector CN6, switch the Printer On and check for 28.0V AC between pins 1 and 2 of Connector CN6 and for 7.6V AC between pins 3 and 4 of Connector CN6.
- (B) If voltages are missing, check Power Switch (SW1A), AC Fuse (F1), AC Power cord and also check Power Transformer (T1) windings with an ohmmeter.
- (C) If the voltages are present, check the Diode DB1 for a short. Replace or Troubleshoot the FMBD Board.
- (B) If the 22.5V is missing, check the 24.0V at TP VP.
- (C) Check resistances of the Paper Feed Motor (M4) windings and replace Motor M4 if defective.
- (D) If the Motor M4 checks good, check Connector CN4 for good contacts and also check Microprocessor IC (3B).
- (E) If replacement of IC 3B does not correct the problem, replace FMBD Board.

2. WILL NOT RECEIVE DATA FROM COMPUTER

- (A) Check connector cable between the Printer and the Computer.
- (B) Check Connector CN5, check the Printhead cable for broken or cracked circuits and check the connection at Printhead cable Terminal Board connector.

3. PRINTHEAD WILL NOT PRINT

- (A) Remove power and check resistance of the Printhead (HD) Solenoids by removing Connector CN5. Check the resistance for each solenoid. Each solenoid should measure about 20 ohms. If the resistance checks incorrect, replace the printhead.
- (B) Check for 24.0V at pins 14, 15 and 16 of Connector CN5.

4. PRINTHEAD HAS MISSING DOTS

- (A) Check the resistances of Printhead (HD) solenoids (20 Ohms). The Solenoid which controls missing dot will measure incorrectly. If all the Solenoids measure correctly, check for possible bent or broken Printhead wires.
- (B) Check the Printhead cable for cracks and for good connection.
- (C) If the Printhead is normal, check the Microprocessor IC (3B) by substitution.
- (D) If Microprocessor IC (3B) checks good, replace or troubleshoot the FMBD Board.

5. PAPER FEED DOES NOT FUNCTION

- (A) Check for 22.5V at pins 11 and 12 of Connector CN4 while the Printer is printing.

6. CARRIAGE (TIMING BELT) MOTOR DOES FUNCTION PROPERLY

- (A) Check the timing belt engagement on the bottom of the carriage assembly.
- (B) Check the adjustment of the PTS (Position Timing Signal) Sensor (M2).
- (C) Check the resistance of the windings of Carriage (Timing Belt) Motor (M3).
- (D) Check the adjustment of the Carriage Motor assembly and check for MINIMUM lash between the gears without gears locking up.

7. POOR QUALITY PRINT

- (A) Ribbon Cartridge may be worn and due to be replaced.
- (B) See if the ribbon advances and is not jammed. Also check gear assembly for free movement.
- (C) Check the spacing between Printhead (HD) and the Platen and also check position of the Head Adjustment Lever.
- (D) Check for a defective Printhead.

8. PAPER EMPTY INDICATOR DOES NOT FUNCTION

- (A) Check the continuity of the Paper Empty Switch (SW99).
- (B) Make certain Connector CN8 is making good contact.
- (C) Make certain Dip Switch (SW1-3) is set in the Off position.
- (D) Check for a malfunction in the control panel by substitution of Control Panel Assembly.

PRELIMINARY SERVICE CHECKS (Continued)

MECHANICAL REMOVAL AND REPLACEMENT

RIBBON CARTRIDGE REPLACEMENT

Slide Carriage Assembly to center. Move Scale (5-28) to uppermost position. Turn knob on replacement Ribbon Cartridge counterclockwise to tighten ribbon. Install Ribbon Cartridge with the two tabs at each end fitting into the two slots of each side frame and the cartridge seated on the Ribbon Driving Gear (7-3). Do not force it into place. Carefully slide Ribbon between Printhead (5-1) and Ribbon Mask (5-16). Slide Carriage Assembly back and forth to verify proper Ribbon movement.

PRINTHEAD/RIBBON MASK REMOVAL

Remove Platen Cover, Printer Lid and Ribbon Cartridge. If Printer has been operating, allow Printhead (5-1) to cool. Slide Carriage Assembly to the left end of Carriage Shafts to allow access to Head Cable and Head Cable Connector on the Terminal Board (8-1). Hold Connector in place and carefully remove the Head Cable from it by pulling on the plastic tab beneath the Head Cable.

Slide Carriage Assembly to the center position for access to the Head Lock Lever (5-13). Rotate the lever to the left to release the Printhead. Lift Printhead straight up to remove from Carriage Assembly.

Remove the two positioning screws holding Ribbon Mask (5-16) and lift mask from Carriage Assembly.

Reverse the procedure for replacement. See Printhead Adjustment in Miscellaneous Adjustments.

CARRIAGE MOTOR/POSITION-TIME (PTS) SENSOR REMOVAL

Remove upper case. See Disassembly Instructions. Disconnect Connector CN4 from FMBD Board. Remove left-front screw and right-rear screw from base of Carriage Motor (2-1). Lift motor assembly out of Printer base. Free the motor wire harness and separate the Carriage Motor and Position-Time Sensor wires.

Remove the screw holding the Position-Time Sensor Board (3-7) to the motor base and remove Sensor Board from Carriage Motor heat sink. Remove right-front screw and left-rear screw from the motor base to remove the Carriage Motor and Sensor Disk from the heat sink.

Reverse the procedure for replacement. See PTS Sensor Board Adjustment in Miscellaneous Adjustments.

HOME POSITION SENSOR REMOVAL

Remove Platen Cover, Printer Lid and Ribbon Cartridge. Slide Carriage Assembly to the right end of Carriage Shaft to access the Home Position Sensor Connector on the Terminal Board (8-1). Disconnect Connector and remove screw holding Sensor Board. Lift Sensor Assembly out of Printer base.

Reverse the procedure for replacement. See Home Position Sensor Adjustment in Miscellaneous Adjustments.

TIMING BELT REPLACEMENT

Remove Printer mechanism from case. See Disassembly Instructions. Press downward on the Timing Belt (4-1) at each side of the point where belt is attached to Carriage Assembly. CAUTION: Belt may be held in place with adhesive cement. If removal is difficult, slide the Carriage Assembly to the right and over the access hole in the chassis base. Turn the chassis over. Carefully cut the adhesive seal with a razor blade and remove the belt from the Carriage Assembly with needle-nose pliers.

Loosen the screw securing the Belt Tension Plate (4-5) and remove the Timing Belt from the belt-driven pulley. Remove the left-front screw and right-rear screw from the Carriage Motor (2-1). Lift the motor assembly from the Printer base for access to the belt drive pulley. Remove belt from pulley. Push belt through opening in right frame and remove belt from Printer.

Install replacement by reversing the removal procedure. Before adjusting tension, apply a drop of adhesive cement where Timing Belt is attached to Carriage Assembly and allow to dry. See Timing Belt Adjustment in Miscellaneous Adjustments.

BELT TENSION PLATE REMOVAL

Remove upper case. See Disassembly Instructions. Slide Carriage Assembly all the way to the right. Loosen the nut on each end of the front Carriage Shaft (5-17). Remove the left end of the Carriage Shaft from the side frame. Remove the adjustment screw from the Belt Tension Plate (4-5) and lift the Timing Belt (4-1) from the belt-driven pulley. Lift the Tension Plate up and out of the Printer base with ribbon driving gears intact.

Reverse the procedure for replacement. See Timing Belt Adjustment in Miscellaneous Adjustments.

PAPER FEED MOTOR/TRANSMISSION GEAR REMOVAL

Remove upper case. See Disassembly Instructions. Disconnect Connector CN4 from FMBD Board. Remove three screws from base of Paper Feed Motor (2-3). Remove motor from chassis side frame. Free the motor wire harness and separate Paper Feed Motor wires from harness. Pull Transmission Gear (5-3) straight out from side frame and off of gear shaft pin. Retain thrust washer used on inner side of gear.

Reverse the procedure for replacement. Slide motor up to minimize gear lash but do not lock up gears. Perform self-test to check proper paper advancement.

SCALE/PAPER HOLDING LEVERS REMOVAL

Remove upper case. See Disassembly Instructions. Remove two screws holding Platen Cover (6-2). Carefully lift cover backward and upward to clear the lever on the Paper Empty Sensor. Loosen the screws at the end of the Scale (5-28). Remove the E-rings and Springs (5-23) from the Paper

PRELIMINARY SERVICE CHECKS (Continued)

MECHANICAL REMOVAL AND REPLACEMENT (Continued)

Holding Lever Assembly. Lift up the Scale and Paper Holding Levers to remove them from the side frames. Keep the two Lever Springs (5-21) (5-26) released at this point with the assembly. Reassemble in reverse order.

FRICTION/SPROCKET PLATEN REMOVAL

Perform Paper Feed Motor/Transmission Gear Removal and Scale/Paper Holding Levers Removal procedures. Remove the nuts on the ends of the Sprocket Guide Shaft (5-3). Remove the E-ring from the left shaft end of the Platen Assembly (5-2). This will release the Left Bearing (5-4), flat washer and thrust washer. Push the Left Bearing outward and slide the Platen Assembly toward the right. When bearings are clear of side frames, lift Platen Assembly out of chassis.

To remove Left Sprocket Assembly (5-6), slide the assembly off the left end of the Platen Assembly and Sprocket Guide Shafts. To remove Right Sprocket Assembly (5-7), remove the Spring Pin (SP) holding the Platen Gear (5-3), plain

washer, leaf spring, Spacer (5-5) and Right Bearing (5-4). Slide the assembly off the right end of the Platen Assembly and Sprocket Guide Shafts.

TRACTOR REMOVAL

Remove seven screws holding tractor to cabinet bottom. Disconnect Connectors CN4, CN5 and CN8 from FMBD Board. Lift tractor assembly from cabinet bottom.

PAPER EMPTY SENSOR REMOVAL

Remove upper case. See Disassembly Instructions. Disconnect Connector CN8 from the FMBD Board and free wires from restraining hook next to Sensor. Release Spring (3-2) and carefully bend back the holding tab at lower edge of Sensor board. Lift board from the Paper Guide Assembly. To remove the Sensor Lever (3-1), remove the E-ring and Shaft (3-3) from the lever. Reassemble in reverse order.

TEST EQUIPMENT AND TOOLS

TEST EQUIPMENT

Digital Volt/Ohm Meter
Logic Probe
Oscilloscope

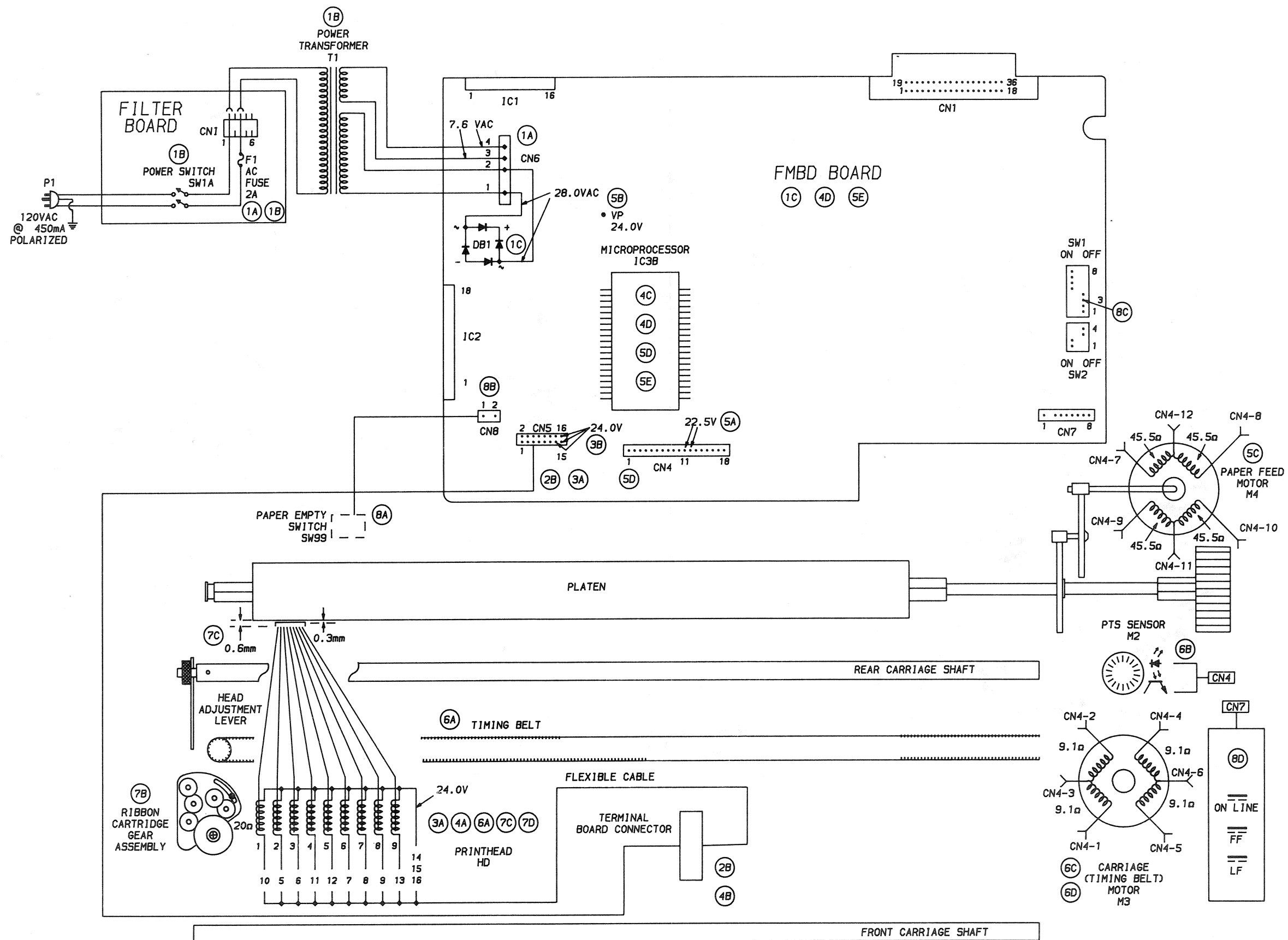
TOOLS

Phillips Screwdriver
Low Voltage Soldering Iron
Desoldering Tool
Small Screwdriver

REPLACEMENT PARTS

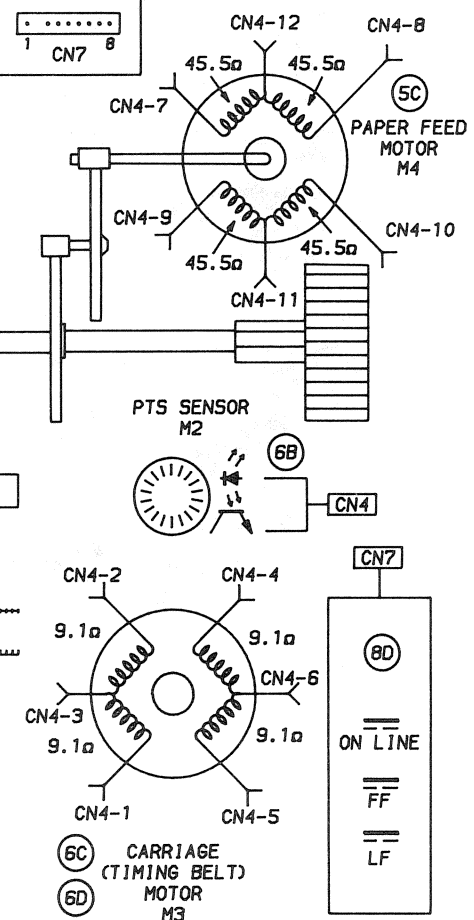
ITEM NO.	PART NO.	DESCRIPTION
DB1	X340300010	Diode, Rectifier
F1	X502060020	AC Fuse, 2A
HD		Printhead (Includes Solenoids)
IC3B	Y440804101	IC, Microprocessor
M3	F315059000	Motor, Carriage (Timing Belt)
M4	F315064000	Motor, Paper Feed
SW1	X620400580	Switch, Dip
SW1A		Switch, Power
SW99	A170202502	Switch, Paper Empty, Reed
T1	Y440501000	Transformer, Power
		Control Panel Assembly
		FMBD Board
		Filter Board
4-1	F303014010	Timing Belt

PRELIMINARY SERVICE CHECKS (Continued)

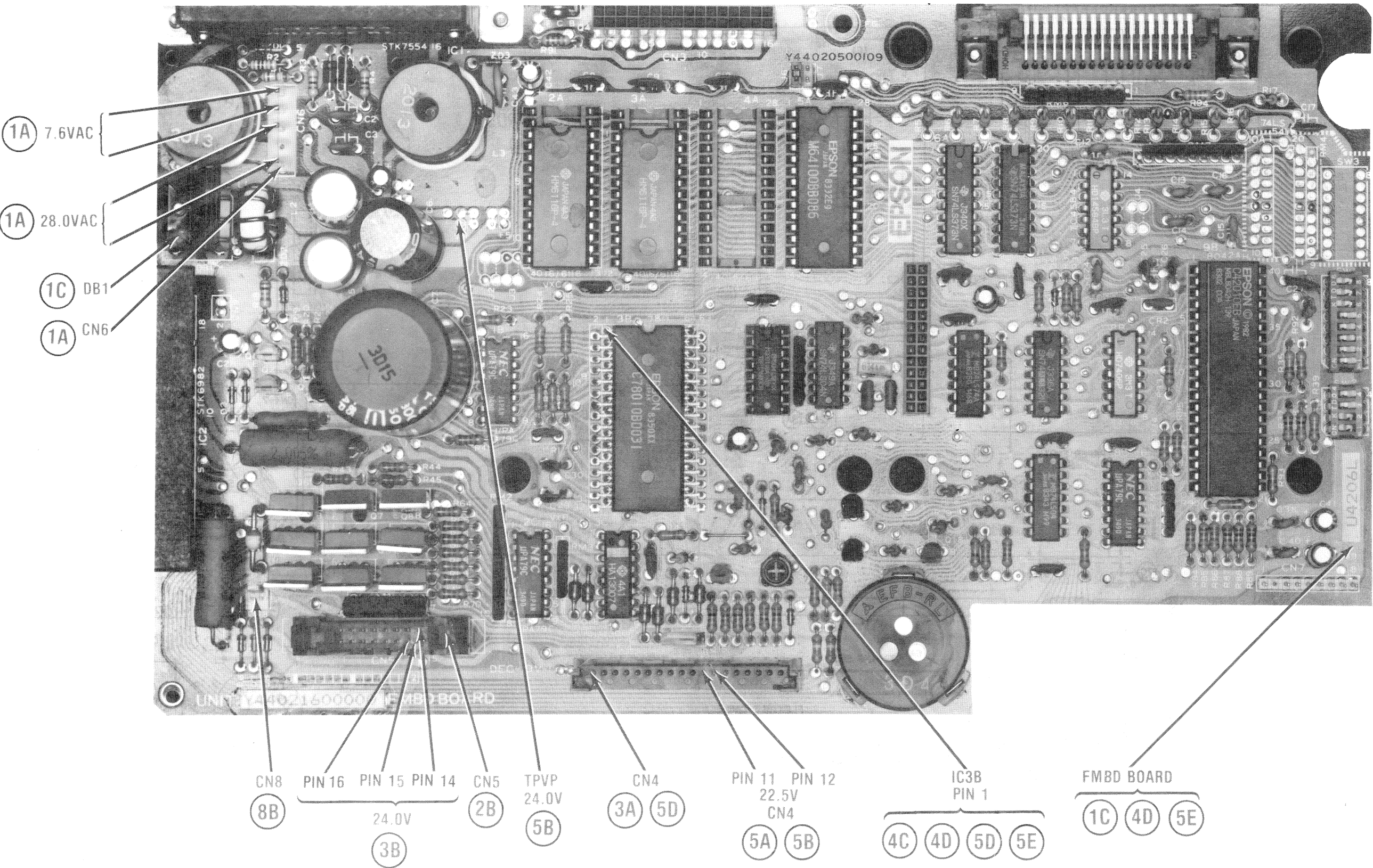


INTERCONNECTING DIAGRAM

PRELIMINARY SERVICE CHECKS (Continued)



INTERCONNECTING DIAGRAM



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PRELIMINARY SERVICE CHECKS (Continued)

MISCELLANEOUS ADJUSTMENTS

HEAD DRIVER PULSE WIDTH ADJUSTMENT

Connect the input of a scope to pin 36 of the Micro-processor IC (3B). Set the horizontal sweep to .1ms, trigger to positive edge. Use the Printer self-test mode (hold LF Button down while switching Printer On) and adjust the Pulse Width Control (VR1) for a pulse width of .62ms, See Figure 1.

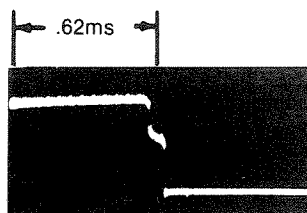


Figure 1

PTS SENSOR BOARD ADJUSTMENT

Connect the input of a scope to TP PTS, set the horizontal sweep to .5ms, trigger to positive edge. Use the Printer self-test mode (hold LF Button down while switching Printer On). Loosen the screw holding the PTS (Position Timing Signal) Sensor board to the right side of the Carriage Motor (M3). Use a screwdriver in the slot provided to adjust the PTS Sensor Board for a pulse cycle of 2.1ms, or a 50% Duty Cycle while the Printer is printing in both directions. See Figure 2.

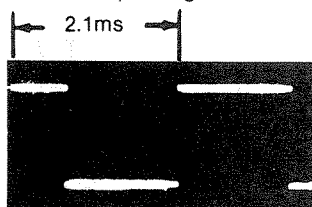


Figure 2

HOME POSITION SENSOR ADJUSTMENT

Loose the HP (Home Position) Sensor screw. Use a small flat screwdriver to move the notch at the front of the HP Sensor Board. Move the notch to the left to move the margin left or to the right to move the margin right. Install the Ribbon Cartridge and perform a self-test to test the margin position. Repeat this procedure until printing begins at the desired position on the paper, tighten the Sensor screw.

TIMING BELT ADJUSTMENT

Loosen the adjustment screw on the belt tension plate. Tighten the belt until no more than 1/4 inch movement occurs on the Printhead when it is at either end of the carriage shaft and the belt is pressed inward. Tighten the adjustment screw on the belt tension plate. Run the printer in self-test mode and note the distance between characters. The distance should be the same. If not, check the timing belt by substitution and perform the carriage motor adjustment.

CARRIAGE MOTOR ADJUSTMENT

Loosen the left-front and right-rear screws on the Carriage Motor (M3) base. Slide Motor M3 toward the front of the Printer to decrease the gear lash. This is done to MINIMIZE the gear lash, without locking the gears tightly together. Slide the motor (M3) toward the rear of the Printer to increase the distance between the gears. Tighten the screws

of the Carriage Motor base and set the Printer in self-test mode to verify consistent speed of the carriage assembly in both directions.

PRINthead ADJUSTMENT

Remove the Printhead (HD) and the Ribbon Mask. Reinstall the Printhead and lock it into position with the Ribbon Mask off. Turn the rear carriage shaft until the widest portion of the hole on the left end of the shaft is upward. Insert a thin screwdriver through the hole to hold the shaft in position and loosen the nut at the left end of the shaft. Set the Head Adjustment Lever to center position and hold in place. Move the Printhead to the middle of the shaft and insert a 0.6mm Feeler Gauge between the Printhead and the Platen. Turn the shaft forward or backward until the gap between the Printhead and Platen is correct. Hold the shaft in place and tighten the nut on the left end of the shaft. Check the adjustment by gauging the gap at the left and right sides and at the center of the Platen. Move the head adjustment Lever toward the Platen and remove the Printhead. Reinstall the Ribbon Mask with a 0.3mm gap between the mask and the Platen and tighten the two screws on the mask. Reinstall the Printhead and check for a gap of about 0.1mm between the Ribbon Mask and the Printhead. Reinstall the ribbon cartridge and perform Printer self-test with the Head Adjustment Lever set to mid-position. The print should be clear and dark without the wires of the Printhead perforating the paper.

DIP SWITCHES

SWITCH SW-1	ON	OFF
1-1 Column length	132 characters /line	80 characters /line
1-2 ZERO Font	0 slashed	0 not slashed
1-3 Paper empty detector	Inactive	Active
1-4 Input buffer	Standard ASCII Accessed	Inactive
1-5 Character mode Power ON	Emphasized	Standard

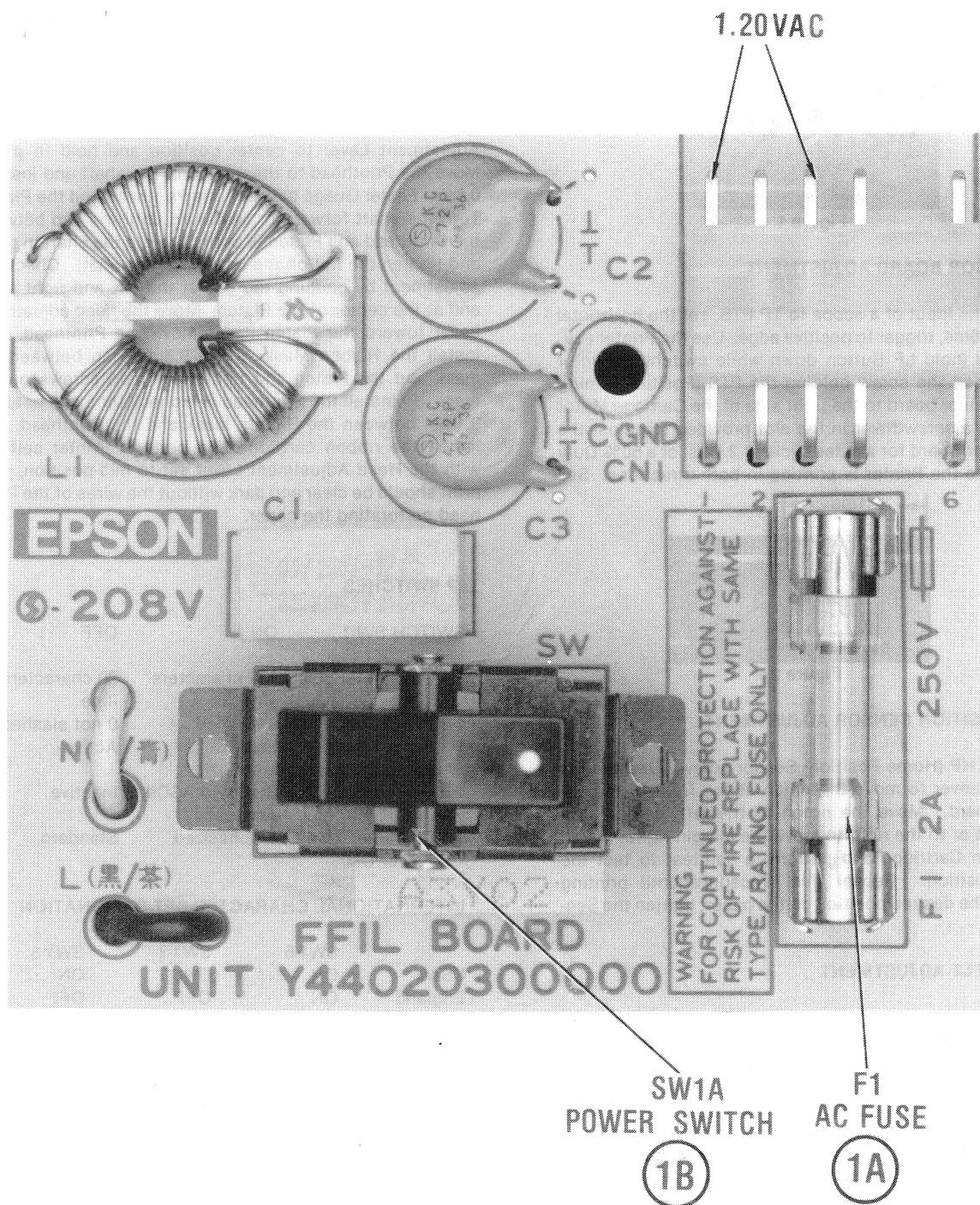
INTERNATIONAL CHARACTER SET DESIGNATION

	SW1-6	SW1-7	SW1-8
USA	ON	ON	ON
England	ON	OFF	OFF
France	ON	ON	OFF
Germany	ON	OFF	ON
Denmark	OFF	ON	ON
Italy	OFF	OFF	ON
Spain	OFF	OFF	OFF
Sweden	OFF	ON	OFF

SWITCH SW-2	ON	OFF
2-1 Select Mode	Fixed Select	Can be selected by Computer
2-2 Buzzer	Buzzer	No Buzzer
2-3 Lower margin one inch	Margin	No Margin
2-4 Auto line feed with Carriage Return	Auto Line Feed	Line feed from Host Computer

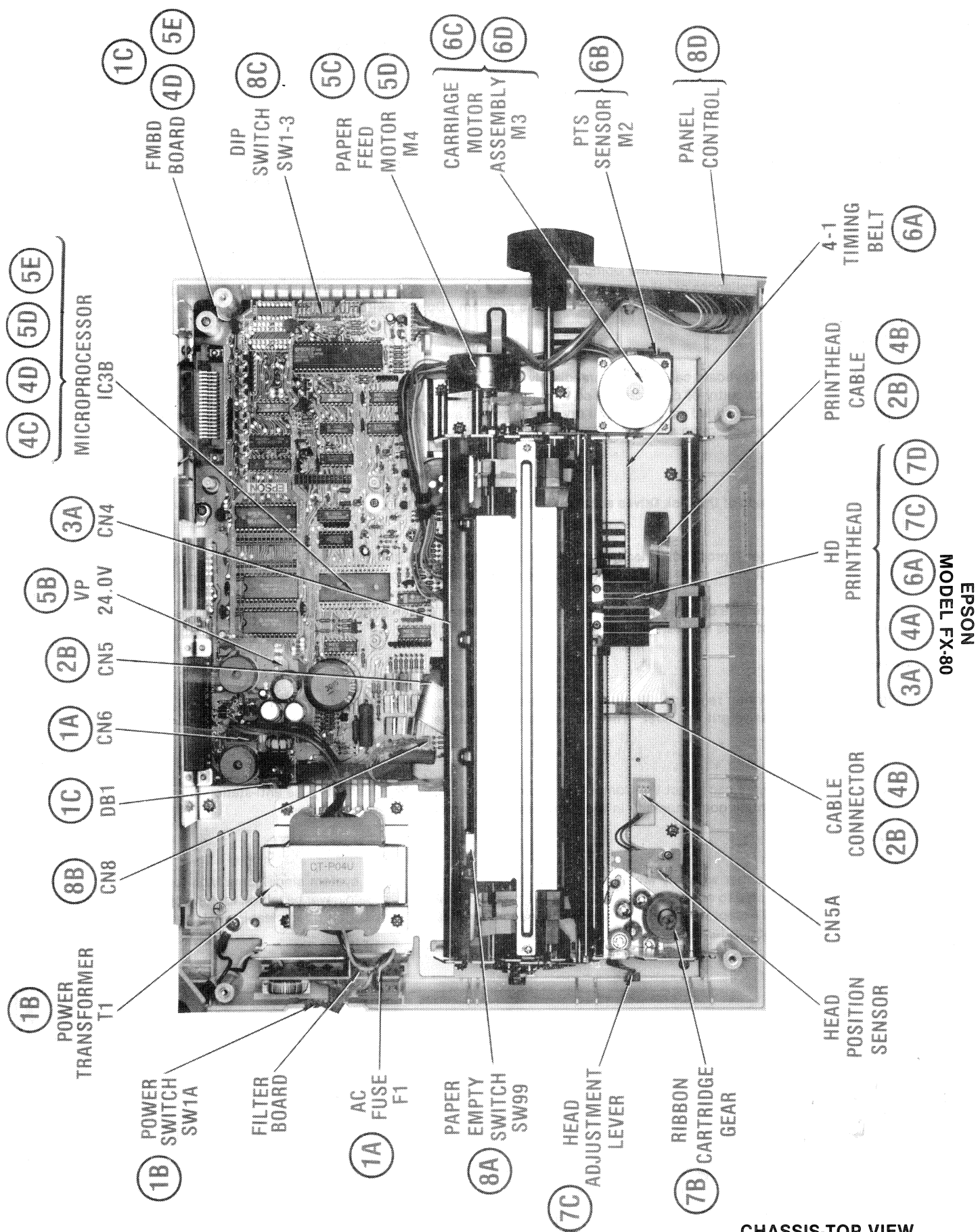
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PRELIMINARY SERVICE CHECKS (Continued)



FILTER BOARD

PRELIMINARY SERVICE CHECKS (Continued)



CHASSIS-TOP VIEW

PRELIMINARY SERVICE CHECKS (Continued)

PREVENTATIVE MAINTENANCE

ENVIRONMENT

Computers perform best in a clean, cool area that is below 80 degrees Fahrenheit and free of dust and smoke particles. Even though home Computers are not affected by cigarette smoke as much as commercial Computers are affected, it is better to maintain a smoke-free area around the Computer. Do not block cabinet vents of any of the Computer system; Computer, Monitor, Printer, or other power devices.

ELECTRICAL POWER

Variations in the line voltage can affect the Computer. Try to avoid these fluctuations by using an AC receptacle that is on a power line not used by appliances or other heavy current demand devices. A power-surge protector, power-line conditioner, or non-interruptible power supply may be needed to cure the problem. **Do not** switch power On and Off frequently.

KEYBOARD

Liquids spilled into the Keyboard can ruin it. Immediately after a spill occurs, disconnect the Computer power plug from AC power outlet. Then, if circuitry or contacts are contaminated, disassemble the Keyboard and carefully rinse the Keyboard printed circuit board with distilled water and let it dry. Use a cotton swab to clean between the keys. Use a non-abrasive contact cleaner and lint-free wipers on accessible connectors and contacts.

DISK DRIVES

Clean the read/write heads of the Disk Drives about once a month or after 100 hours usage. Use only an approved head cleaning kit.

Handle carefully to preserve proper disk head alignment. A sudden bump or jolt to the Disk Drives can knock the disk head out of alignment. If the disk drive must be transported, place an old disk in slot and close door during transport.

Store disks in their protective covers and never touch the disk surface. Observe the disk handling precautions usually found on the back of disk protective covers.

PRINTERS

Carefully vacuum the Printer regularly. Wipe surface areas clean using a light all-purpose cleaner. Do not oil the machine. The oil will collect abrasive grit and dust. The dust will act as a blanket. This can cause components to overheat and fail.

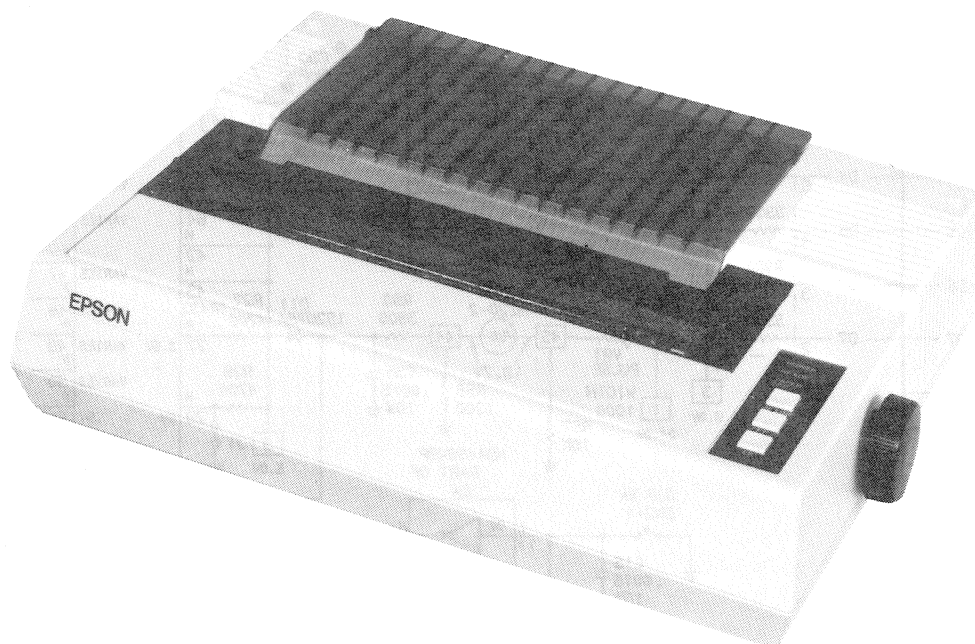
STATIC ELECTRICITY

Static electricity discharge can affect the Computer. In order to minimize the possibility, use anti-static mats, sprays, tools and materials, and maintain good humidity in the Computer environment.

MONITOR

Use an isolation transformer with any Monitor that does not come as part of the system since some Monitors use a HOT chassis (chassis connected to one side of the AC line). The face of the Monitor should never be left on for long periods of time at high brightness level except when pattern is being changed periodically. Use caution when cleaning anti-glare screens, to preserve the glare-reduction feature.

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PRELIMINARY SERVICE CHECKS

ENCLOSED

SAFETY PRECAUTIONS

See page 4.

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SAMS™

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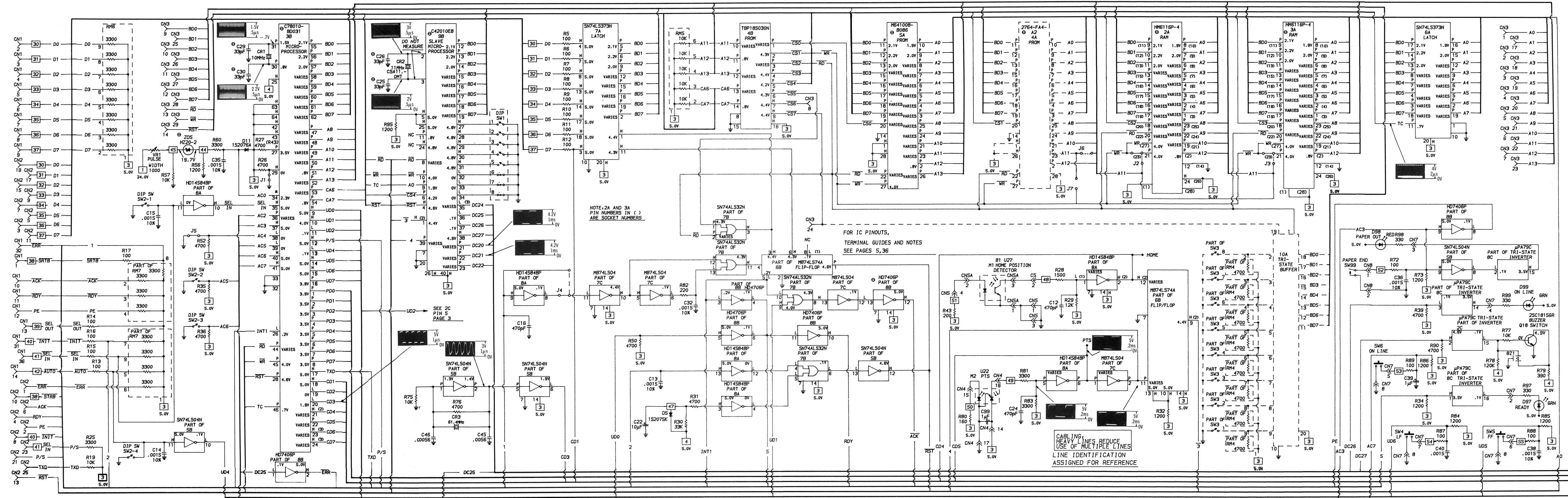
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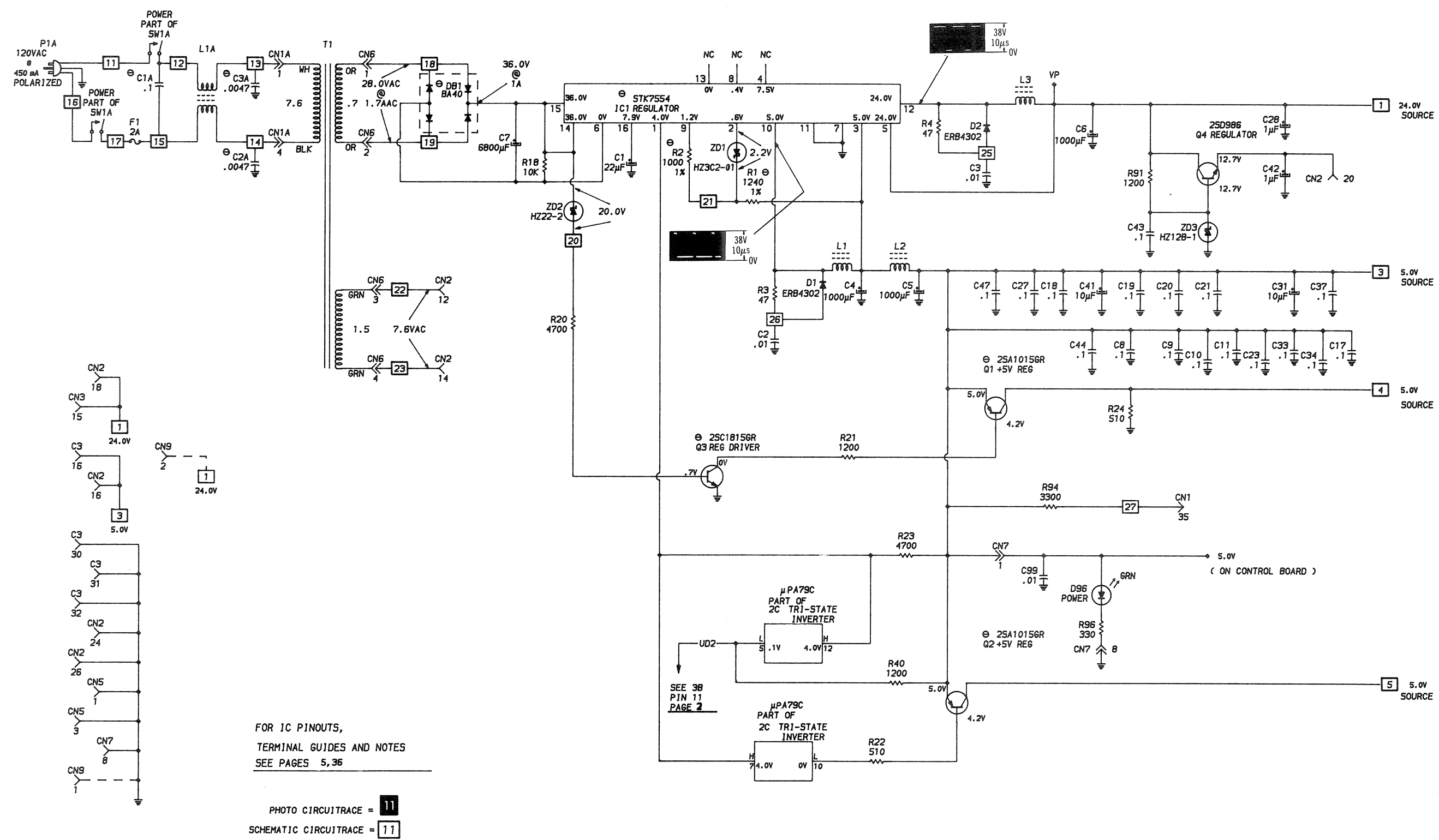
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A PHOTOFAC STANDARD NOTATION SCHEMATIC
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SAFETY PRECAUTIONS

1. Use an isolation transformer for servicing.
2. Maintain AC line voltage at rated input.
3. Remove AC power from the printer before servicing or installing electrostatically sensitive devices. Examples of typical ES devices are integrated circuits and semiconductor "chip" components.
4. Use extreme caution when handling the printed circuit boards. Some semiconductor devices can be damaged easily by static electricity. Drain off any electrostatic charge on your body by touching a known earth ground. Wear a commercially available discharging wrist strap device. This should be removed prior to applying power to the unit under test.
5. Use a grounded-tip, low voltage soldering iron.
6. Use an isolation (times 10) probe on scope.
7. Do not remove or install boards, mechanical or electrical parts, or other peripherals with printer AC power On.
8. Do not use freon-propelled sprays. These can generate electrical charges sufficient to damage semiconductor devices.
9. This printer is equipped with a grounded three-pronged AC plug. This plug must fit into a grounded AC power outlet. Do not defeat the AC plug safety feature.
10. Periodically examine the AC power cord for damaged or cracked insulation.
11. The printer cabinet is equipped with vents to prevent heat build-up. Never block, cover, or obstruct these vents.
12. Instructions should be given, especially to children, that objects should not be dropped or pushed into the vents of the cabinet. This could cause shock or equipment damage.
13. Never expose the printer to water. If exposed to water turn the unit Off. Do not place the printer near possible water sources.
14. Never leave the printer unattended or plugged into the AC outlet for long periods of time. Remove AC plug from AC outlet during lightning storms.
15. Do not allow anything to rest on AC power cord.
16. Unplug AC power cord from outlet before cleaning printer.
17. Never use liquids or aerosols directly on the printer. Spray on cloth and then apply to the printer cabinet. Make sure the printer is disconnected from the AC power line.

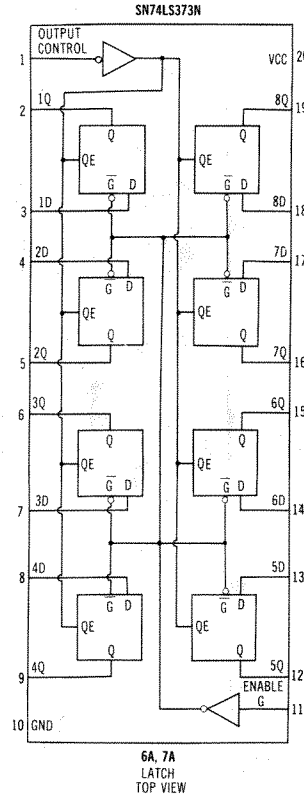
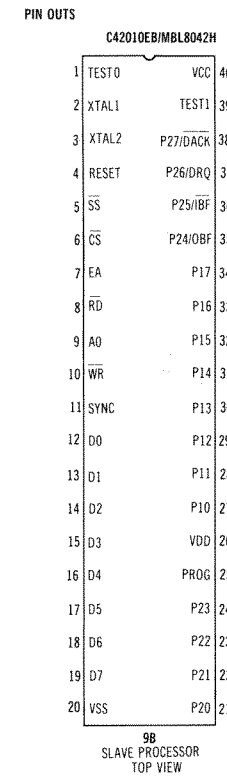
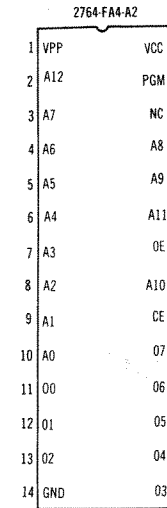
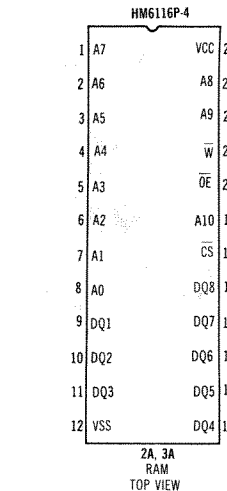
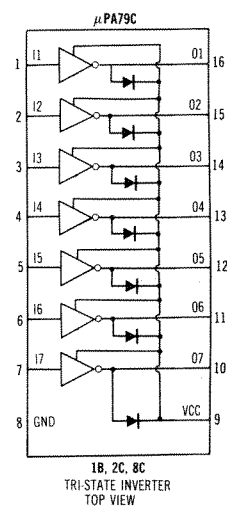
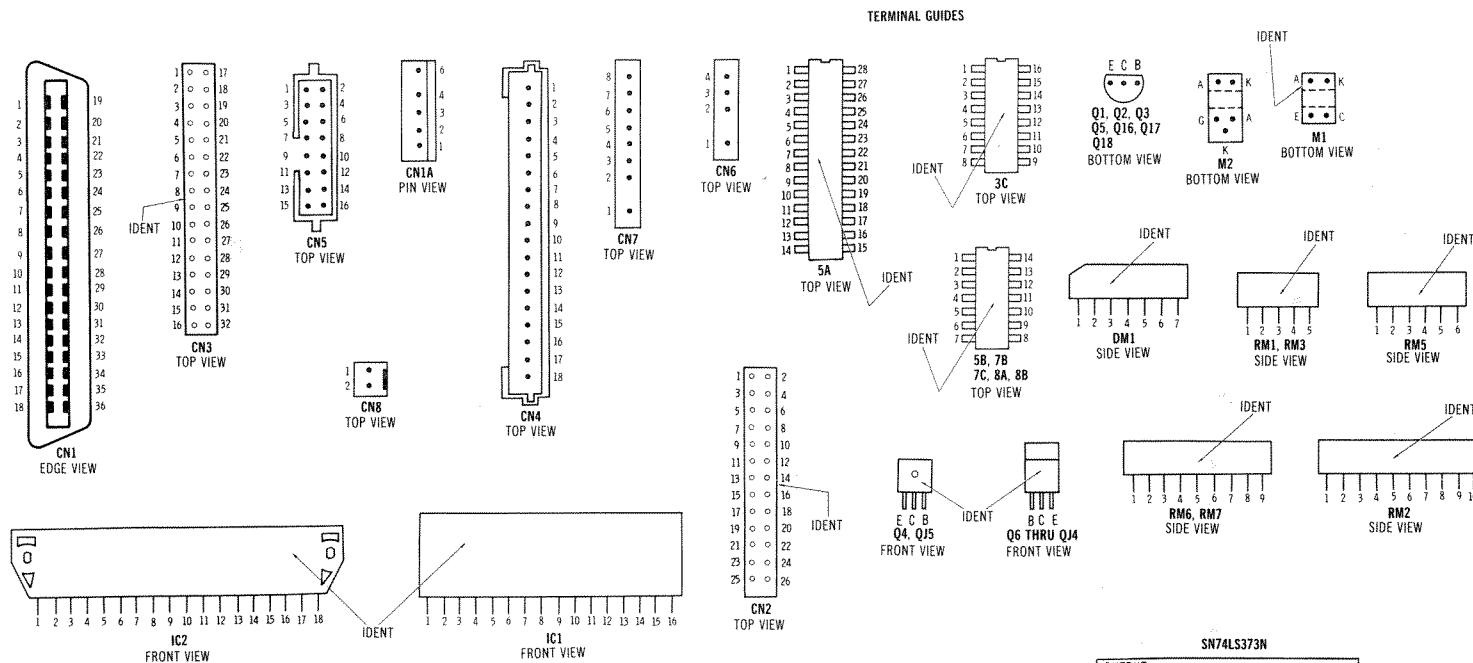
LINE DEFINITIONS

A0 Thru A13 Address Lines
AC2 Thru AC7
ACK Acknowledge
BD0 Thru BD7 Data Lines
CA6
CA7
CD1 Thru CD7 Control Data Lines
CS0 Thru CS7 Chip Select
D0 Thru D7 Data Lines
DC20 Thru DC22
DC24 Thru DC27
ERR Error
INIT Initialize
INT1 Interrupt
PD0 Thru PD7 Data Lines
PE Paper Empty

P/S Parallel/Serial
RD Read
RDY Ready
RST Reset
SEL Select
SEL IN Select Input
SEL OUT Select Output
TC
TXD PET/TRS Select
UD0 Thru UD7 Data Lines
WR Write
1 Line Identification
2 Line Identification
3 Line Identification
4 Line Identification
5 Line Identification

Any Bar above any alphabetical or numerical combination indicates line active in a low (0) state.

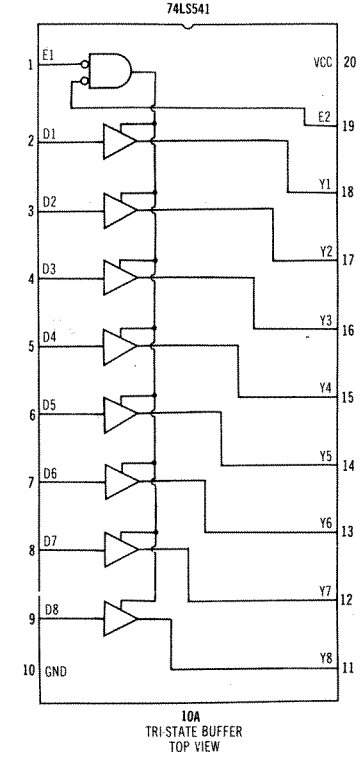
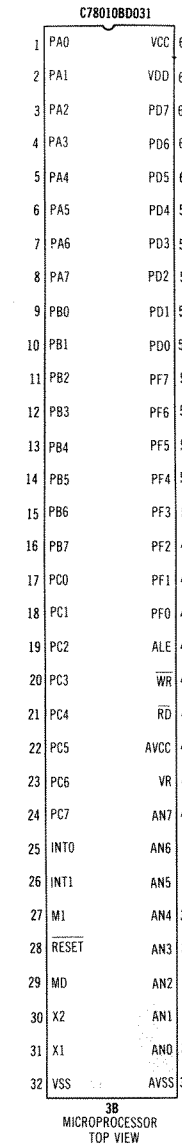
IC PINOUTS, TERMINAL GUIDES AND SCHEMATIC NOTES



SCHEMATIC NOTES

- Circuitry not used in some versions
- Circuitry used in some versions
- See parts list
- ⊕ Ground

Voltages measured with digital meter.
Waveforms and voltages are taken from ground, unless noted otherwise.
Voltages, waveforms and logic readings taken with printer On Line and in self-test mode unless otherwise noted.
Switches SW1 and SW2 set as shown on schematic.
Waveforms taken with triggered scope and Sweep/Time switch in Calibrate position, scope input set for DC coupling on "0" reference voltage waveforms. Switch to AC input to view waveforms after DC reference is measured when necessary. Each waveform is 7.5cm width with DC reference voltage given at the bottom line of



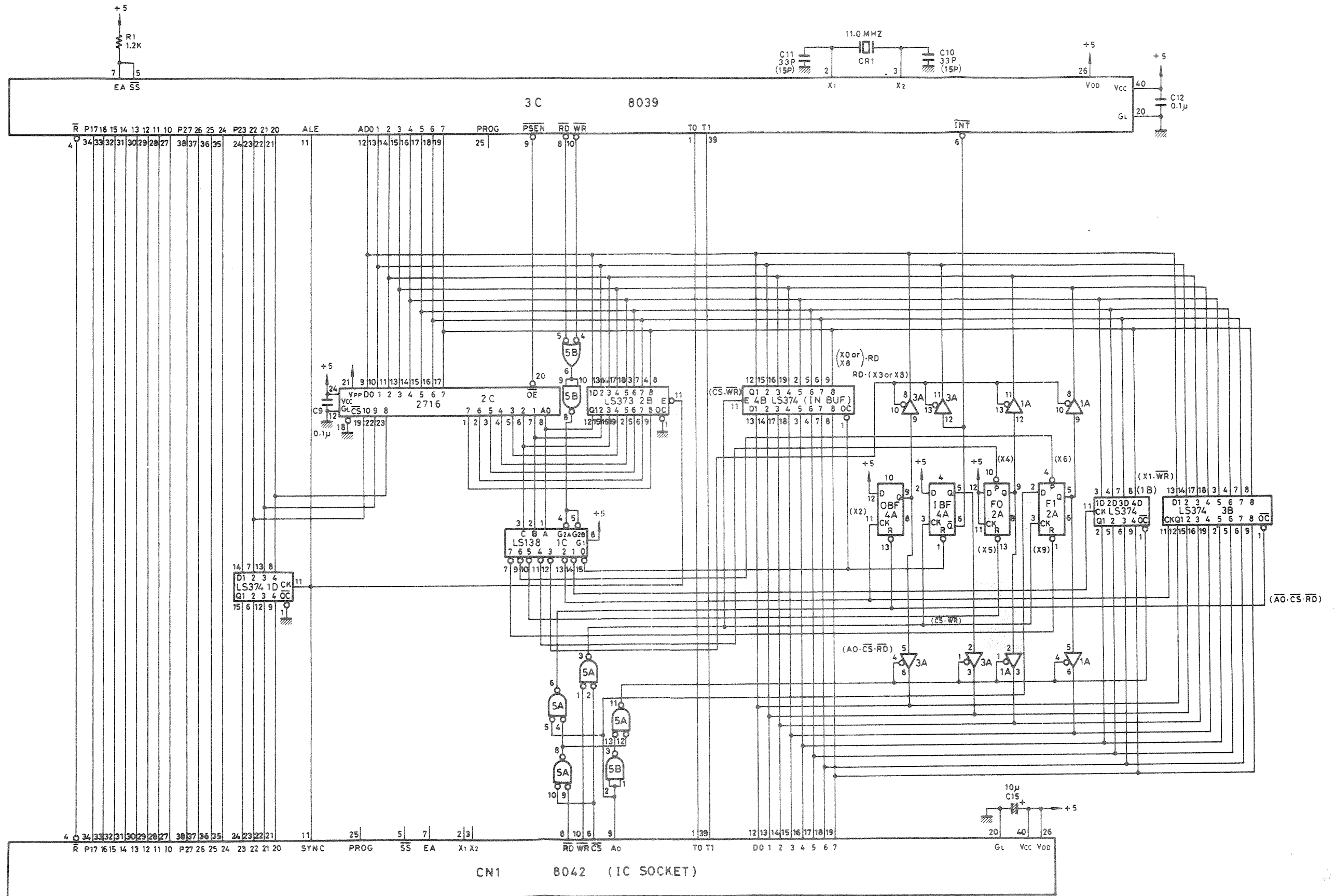
each waveform. Time in μ s per cm, given with p-p reading at the end of each waveform.
Item numbers in rectangles appear in the alignment/adjustment instructions.
Supply voltage maintained as shown at input.
Controls adjusted for normal operation.
Terminal identification may not be found on unit.
Resistors are $\frac{1}{2}$ W or less, 5% unless noted.
Value in () used in some versions.

NOTE: Logic probe readings taken with printer On Line and in self-test mode unless otherwise noted. Switches SW1 and SW2 set as shown on schematic.

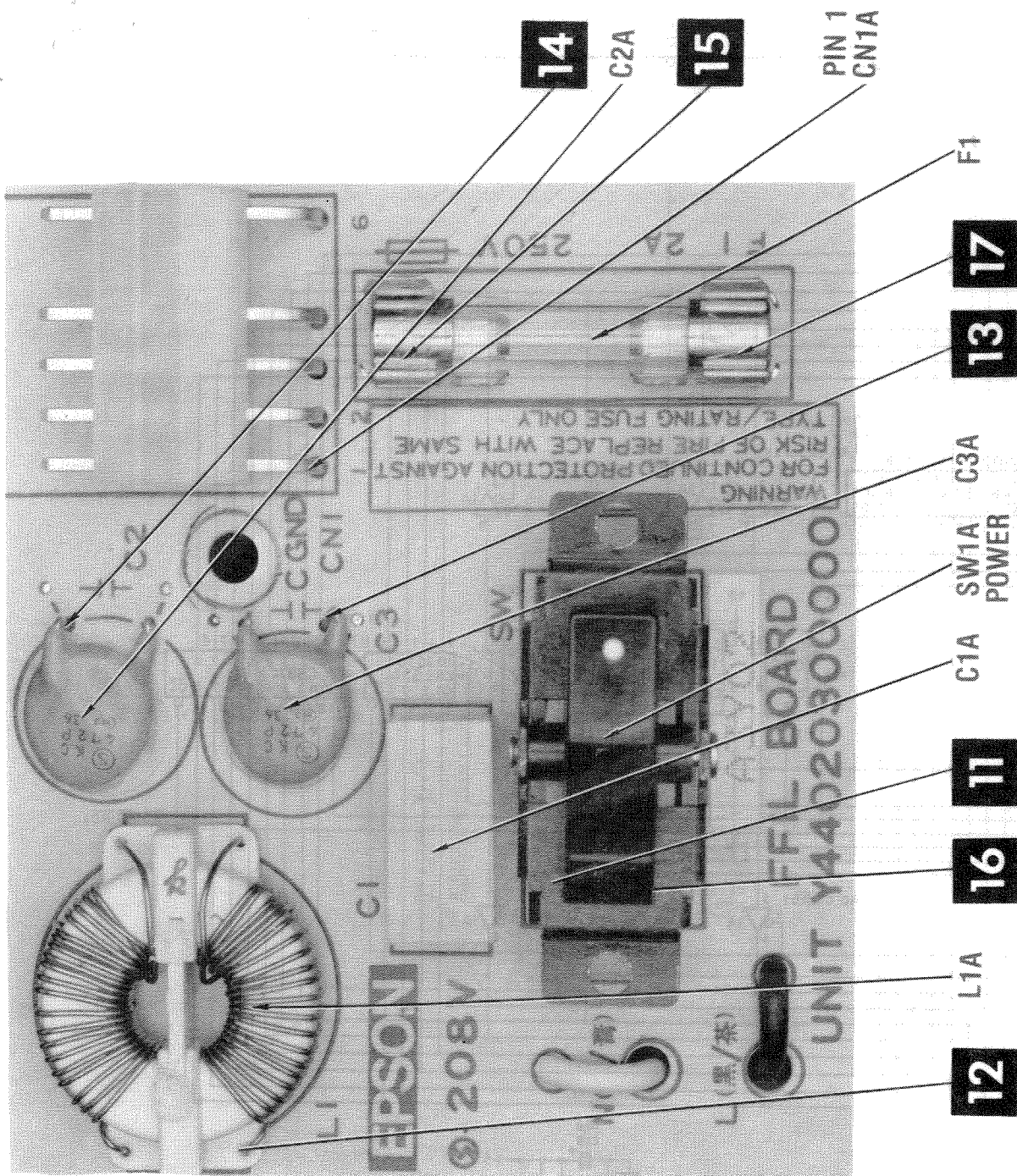
Logic Probe Display
L = Low
H = High
P = Pulse
* = Open (No lights On)

- (1) Probe indicates H when printhead is at home position.
- (2) Probe indicates L when printhead is at home position.
- (3) Probe indicates P during line feed.
- (4) Logic readings not taken.
- (5) Do Not Measure.





NOTE: SUMI BOARD USED IN MODELS WITH
SERIAL NUMBERS 310001 TO 313035



FILTER BOARD

A Howard W. Sams **CIRCUITRACE®** Photo

MISCELLANEOUS ADJUSTMENTS

HEAD DRIVER PULSE WIDTH ADJUSTMENT

Connect the input of a scope to pin 36 of the Micro-processor IC (3B). Set the horizontal sweep to .1ms, trigger to positive edge. Use the Printer self-test mode (hold LF Button down while switching Printer On) and adjust the Pulse Width Control (VR1) for a pulse width of .62ms, See Figure 1.

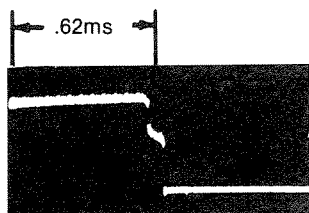


Figure 1

PTS SENSOR BOARD ADJUSTMENT

Connect the input of a scope to TP PTS, set the horizontal sweep to .5ms, trigger to positive edge. Use the Printer self-test mode (hold LF Button down while switching Printer On). Loosen the screw holding the PTS (Position Timing Signal) Sensor board to the right side of the Carriage Motor (M3). Use a screwdriver in the slot provided to adjust the PTS Sensor Board for a pulse cycle of 2.1ms, or a 50% Duty Cycle while the Printer is printing in both directions. See Figure 2.

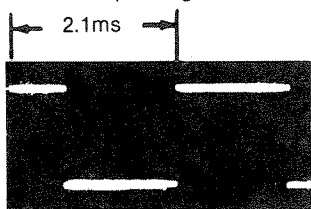


Figure 2

HOME POSITION SENSOR ADJUSTMENT

Loose the HP (Home Position) Sensor screw. Use a small flat screwdriver to move the notch at the front of the HP Sensor Board. Move the notch to the left to move the margin left or to the right to move the margin right. Install the Ribbon Cartridge and perform a self-test to test the margin position. Repeat this procedure until printing begins at the desired position on the paper, tighten the Sensor screw.

TIMING BELT ADJUSTMENT

Loosen the adjustment screw on the belt tension plate. Tighten the belt until no more than 1/4 inch movement occurs on the Printhead when it is at either end of the carriage shaft and the belt is pressed inward. Tighten the adjustment screw on the belt tension plate. Run the printer in self-test mode and note the distance between characters. The distance should be the same. If not, check the timing belt by substitution and perform the carriage motor adjustment.

CARRIAGE MOTOR ADJUSTMENT

Loosen the left-front and right-rear screws on the Carriage Motor (M3) base. Slide Motor M3 toward the front of the Printer to decrease the gear lash. This is done to MINIMIZE the gear lash, without locking the gears tightly together. Slide the motor (M3) toward the rear of the Printer to increase the distance between the gears. Tighten the screws

of the Carriage Motor base and set the Printer in self-test mode to verify consistent speed of the carriage assembly in both directions.

PRINthead ADJUSTMENT

Remove the Printhead (HD) and the Ribbon Mask. Reinstall the Printhead and lock it into position with the Ribbon Mask off. Turn the rear carriage shaft until the widest portion of the hole on the left end of the shaft is upward. Insert a thin screwdriver through the hole to hold the shaft in position and loosen the nut at the left end of the shaft. Set the Head Adjustment Lever to center position and hold in place. Move the Printhead to the middle of the shaft and insert a 0.6mm Feeler Gauge between the Printhead and the Platen. Turn the shaft forward or backward until the gap between the Printhead and Platen is correct. Hold the shaft in place and tighten the nut on the left end of the shaft. Check the adjustment by gauging the gap at the left and right sides and at the center of the Platen. Move the head adjustment Lever toward the Platen and remove the Printhead. Reinstall the Ribbon Mask with a 0.3mm gap between the mask and the Platen and tighten the two screws on the mask. Reinstall the Printhead and check for a gap of about 0.1mm between the Ribbon Mask and the Printhead. Reinstall the ribbon cartridge and perform Printer self-test with the Head Adjustment Lever set to mid-position. The print should be clear and dark without the wires of the Printhead perforating the paper.

DIP SWITCHES

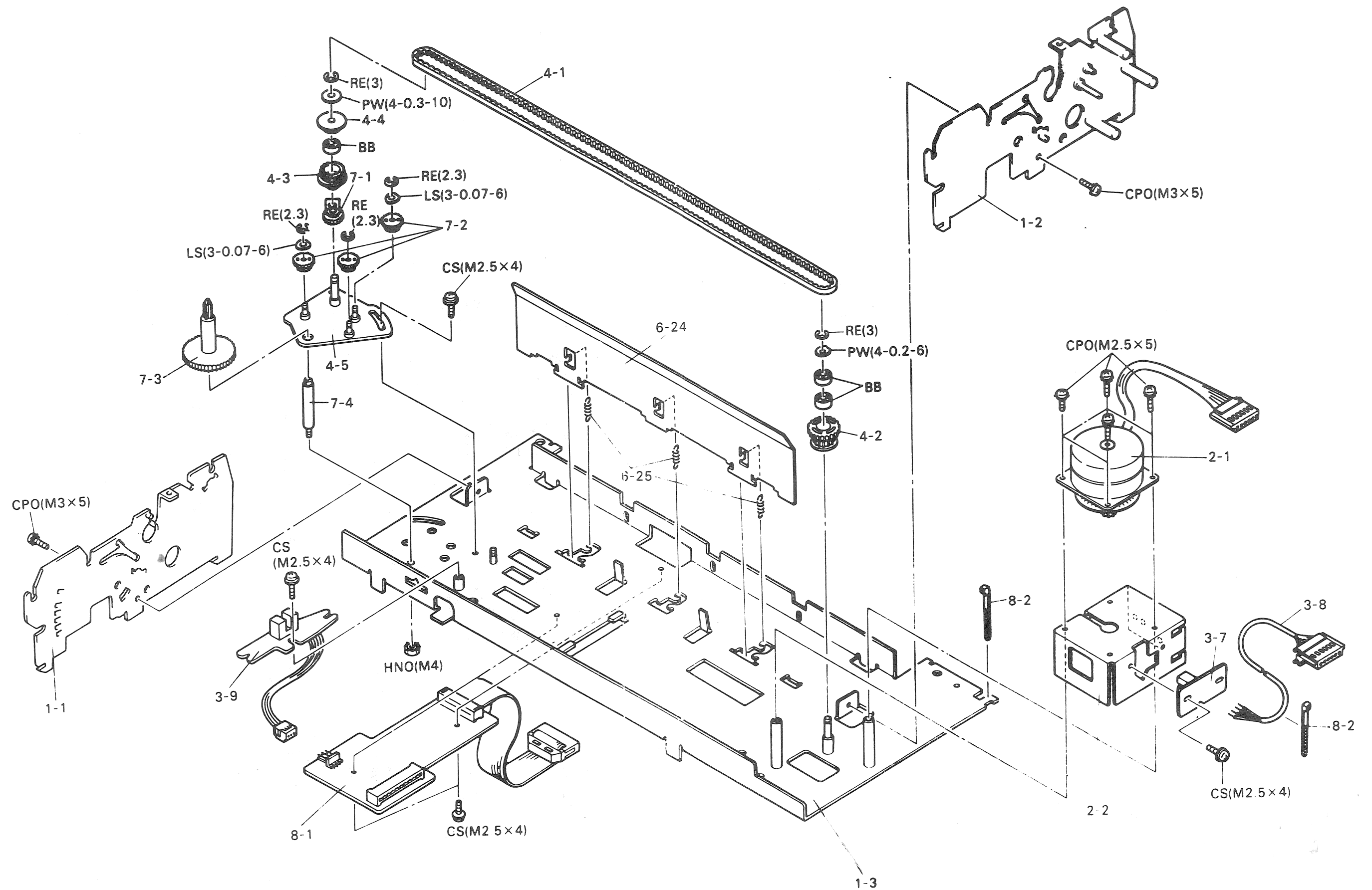
SWITCH SW-1	ON	OFF
1-1 Column length	132 characters /line	80 characters /line
1-2 ZERO Font	0 slashed	0 not slashed
1-3 Paper empty detector	Inactive	Active
1-4 Input buffer	Standard ASCII Accessed	Inactive
1-5 Character mode Power ON	Emphasized	Standard

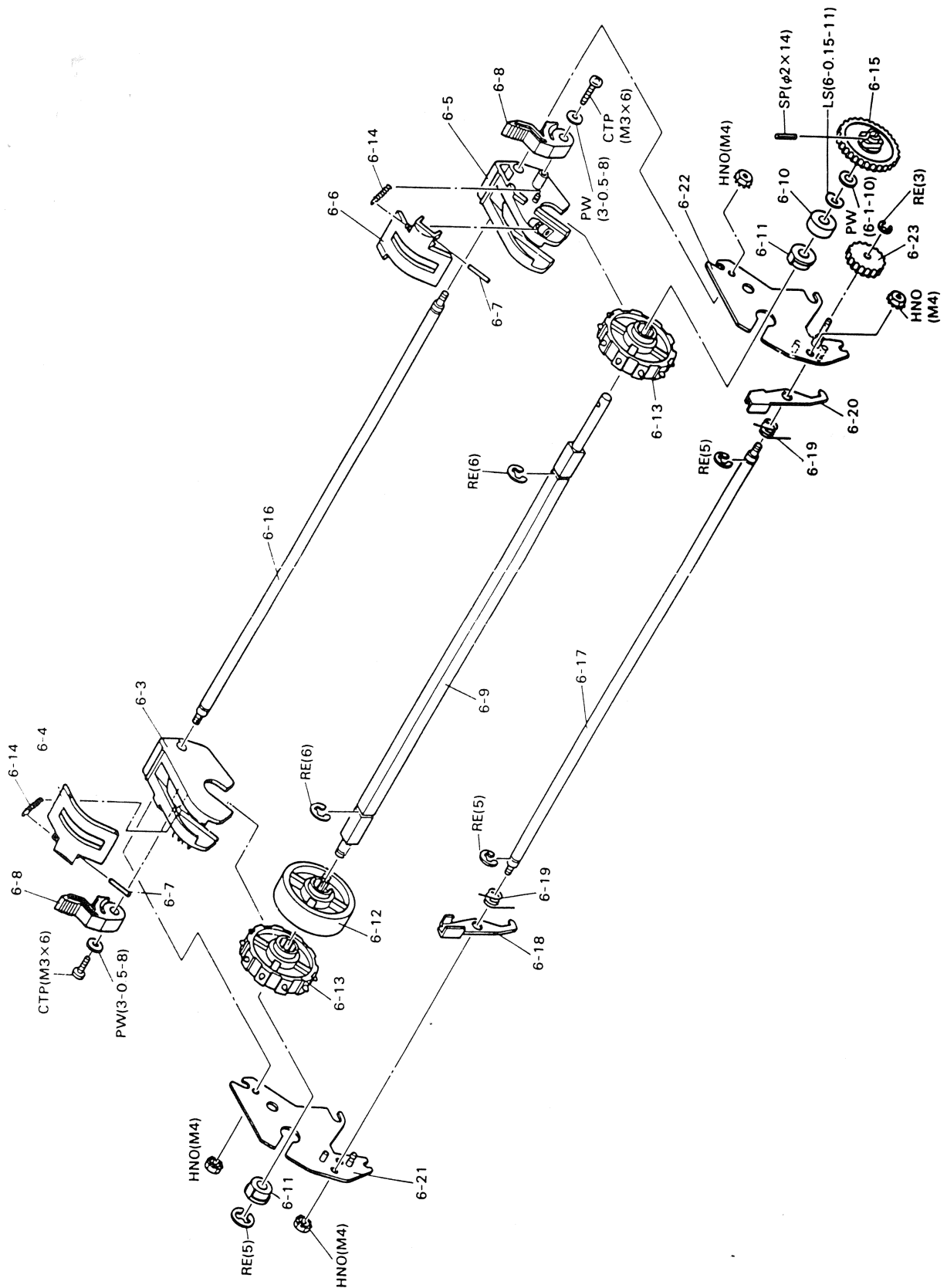
INTERNATIONAL CHARACTER SET DESIGNATION

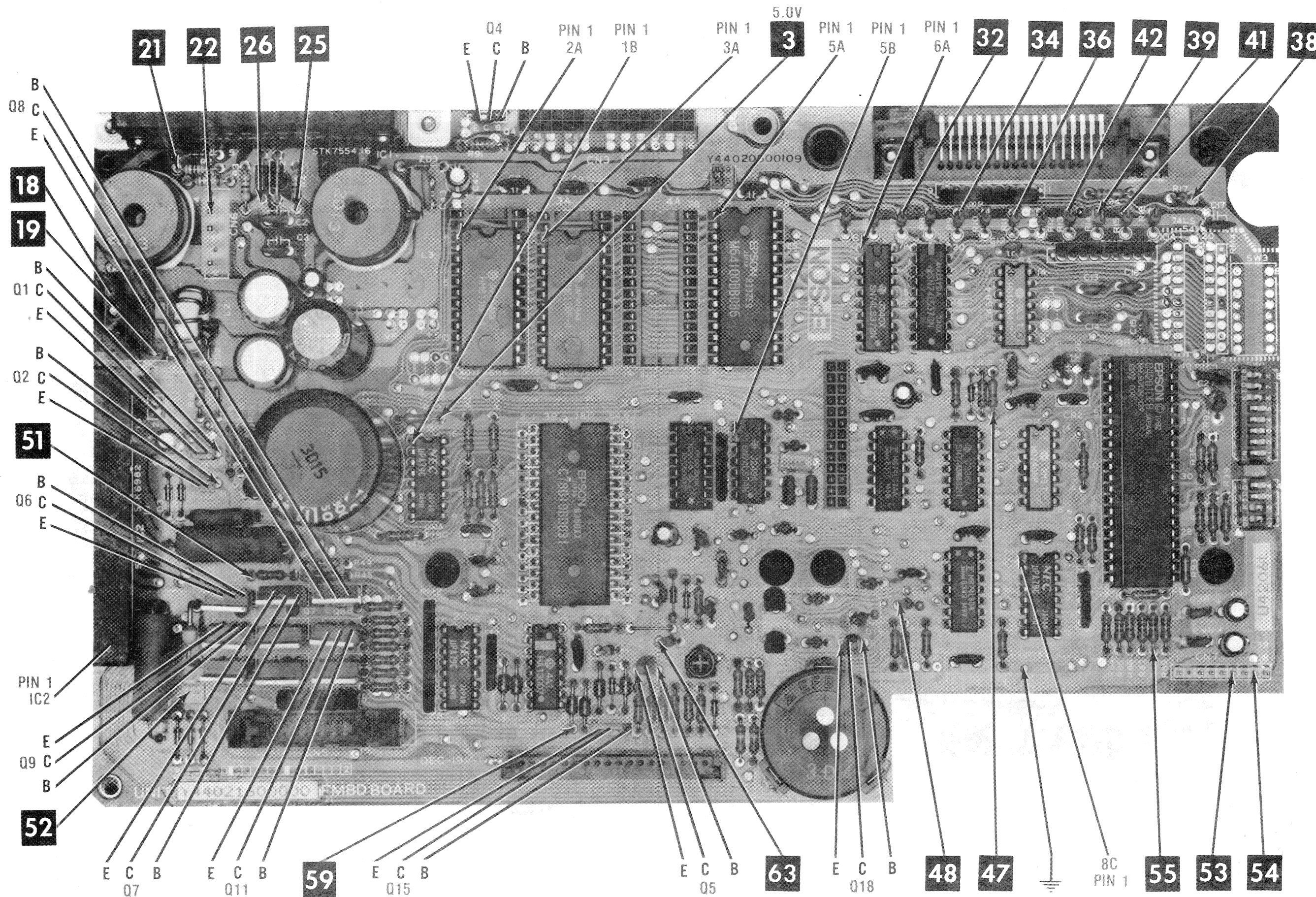
	SW1-6	SW1-7	SW1-8
USA	ON	ON	ON
England	ON	OFF	OFF
France	ON	ON	OFF
Germany	ON	OFF	ON
Denmark	OFF	ON	ON
Italy	OFF	OFF	ON
Spain	OFF	OFF	OFF
Sweden	OFF	ON	OFF

SWITCH SW-2	ON	OFF
2-1 Select Mode	Fixed Select	Can be selected by Computer
2-2 Buzzer	Buzzer	No Buzzer
2-3 Lower margin one inch	Margin	No Margin
2-4 Auto line feed with Carriage Return	Auto Line Feed	Line feed from Host Computer

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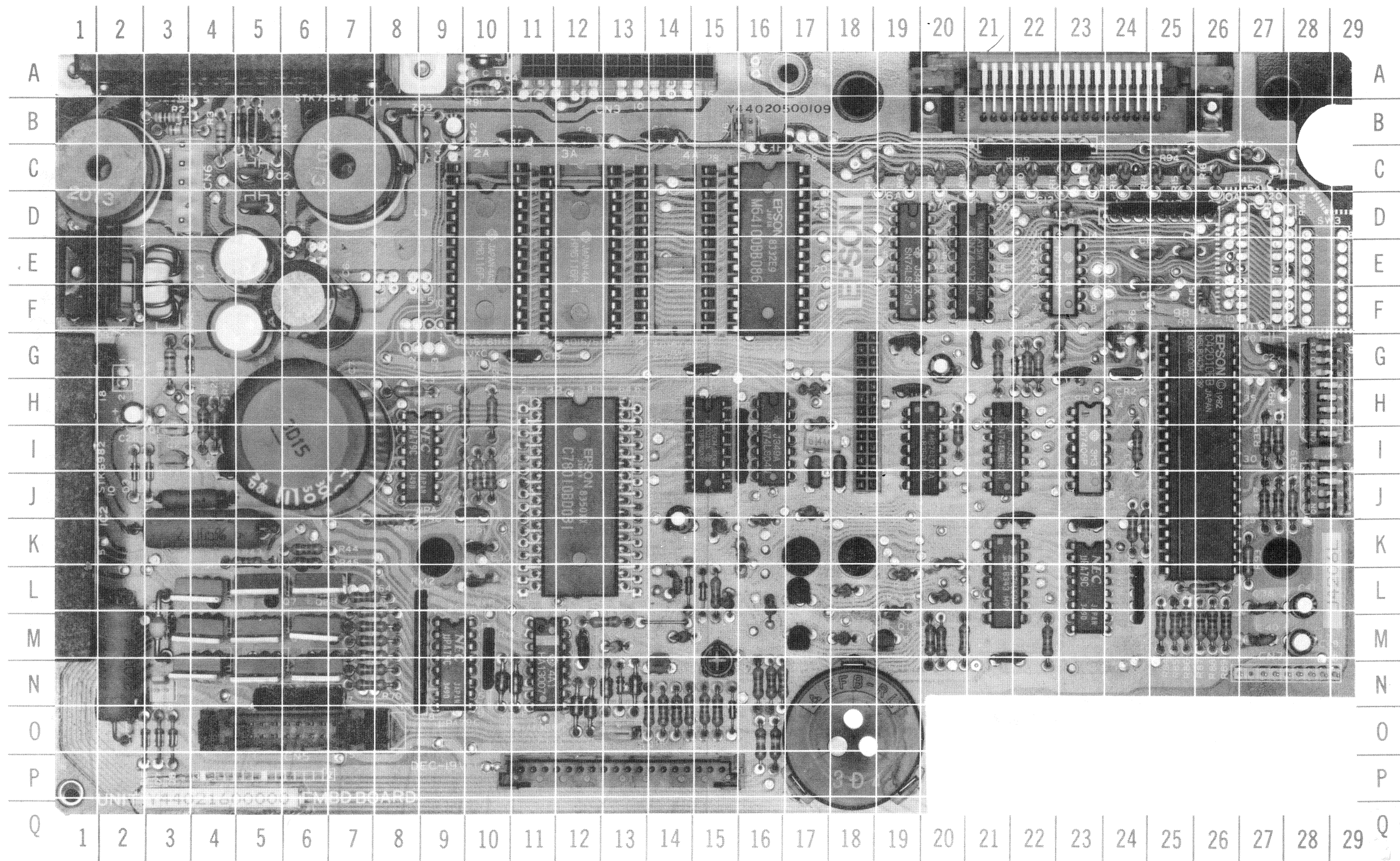






FMBD BOARD

FMBD BOARD



EPSON
MODEL FX-80

FMBD BOARD GridTrace LOCATION GUIDE

BZ1	P-18	L1	C-2	R54	O-14	9B	I-26
C1	E-6	L2	E-3	R55	O-14		
C2	C-5	L3	C-7	R56	O-15		
C3	D-5	Q1	I-3	R57	O-15		
C4	E-5	Q2	I-3	R58	O-16		
C5	F-5	Q3	I-4	R59	O-16		
C6	F-6	Q4	A-10	R60	L-15		
C7	I-6	Q5	N-14	R61	N-16		
C12	D-23	Q6	L-4	R62	N-16		
C13	E-24	Q7	L-5	R63	N-16		
C14	F-24	Q8	L-6	R64	L-7		
C15	F-26	Q9	M-4	R65	L-7		
C16	E-25	Q10	M-5	R66	M-7		
C18	G-11	Q11	M-6	R67	M-7		
C19	G-15	Q12	N-4	R68	M-7		
C20	G-19	Q13	N-5	R69	N-7		
C21	H-19	Q14	N-6	R70	N-7		
C22	G-20	Q15	O-13	R71	L-16		
C23	G-21	Q16	L-17	R72	L-17		
C24	G-22	Q17	M-17	R73	K-16		
C25	G-24	Q18	M-19	R74	J-17		
C26	G-24	R1	B-3	R75	H-17		
C27	G-27	R2	B-3	R76	H-17		
C28	H-2	R3	B-4	R77	M-18		
C29	L-10	R4	B-5	R78	L-19		
C30	K-10	R5	C-19	R79	M-19		
C31	K-14	R6	C-19	R80	M-20		
C32	K-20	R7	C-20	R81	M-20		
C35	L-14	R8	C-21	R82	M-20		
C36	K-16	R9	C-21	R83	M-22		
C37	M-22	R10	C-22	R84	M-25		
C38	L-27	R11	C-23	R85	M-25		
C39	M-28	R12	C-24	R86	M-25		
C40	M-27	R13	C-24	R87	M-26		
C41	L-28	R14	C-25	R88	M-26		
C42	B-9	R15	C-25	R89	M-26		
C43	B-9	R16	C-26	R90	L-26		
C44	G-23	R17	C-27	R91	A-10		
C45	J-17	R18	G-3	R92	G-27		
C46	J-18	R19	H-4	R93	K-27		
C47	M-12	R20	H-4	R94	C-25		
CN1	A-23	R21	H-4	R95	K-24		
CN2	H-18	R22	H-5	RM1	L-24		
CN3	A-13	R23	H-8	RM2	M-9		
CN4	P-13	R24	H-10	RM3	M-10		
CN5	O-6	R25	H-10	RM5	I-16		
CN6	C-3	R26	J-10	RM6	C-22		
CN7	N-28	R27	J-10	RM7	D-25		
CN8	N-3	R28	L-20	SW1	H-28		
CR1	J-10	R29	G-21	SW2	J-28		
CR2	G-24	R30	G-22	VP	F-8		
CR3	I-17	R31	G-22	VR1	N-15		
D1	B-5	R32	I-20	ZD1	A-3		
D2	B-5	R33	I-24	ZD2	G-3		
D3	J-2	R34	K-24	ZD3	B-8		
D4	J-3	R35	L-27	ZD4	M-3		
D5	G-22	R36	I-27	ZD5	O-15		
D6	O-3	R37	J-27	1B	I-9		
D7	O-3	R38	J-27	2A	D-10		
D8	O-3	R39	J-28	2C	N-9		
D9	N-10	R40	K-8	3A	D-12		
D10	N-11	R41	J-4	3B	J-12		
D11	L-15	R42	K-4	3C	M-11		
D12	L-14	R43	K-5	4B	I-15		
D13	O-12	R44	K-6	5A	D-16		
D14	O-12	R45	K-6	5B	I-16		
D15	N-13	R46	M-2	6A	E-19		
D15	N-13	R47	M-13	6B	I-20		
D16	N-13	R48	M-13	7A	E-21		
DB1	E-1	R49	M-14	7B	I-21		
DM1	M-6	R50	K-15	7C	L-21		
HOME	K-16	R51	O-14	8A	E-23		
IC1	A-5	R52	L-15	8B	I-23		
IC2	J-1	R53	O-14	8C	L-23		

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TROUBLESHOOTING

POWER SUPPLY

Printer will not turn On. Check the AC Fuse (F1). If Fuse F1 is open, check Capacitors C2 and C3 on AC Switch Board for possible short. Check Power Transformer (T1) for shorted windings and check the inputs and the outputs of the Diode DB1 for a possible short to ground. If Fuse F1 is good, apply power and check for 120VAC between pins 1 and 4 of Connector CN1A. If the 120VAC is missing, check the Power Switch (SW1A) and the line cord. If the 120VAC is present, check for 28.0VAC between pins 1 and 2 of Connector CN6, and for 7.6VAC between pins 3 and 4 of Connector CN6. If any of these voltages are missing, check Transformer T1 by substitution. If the voltages are present, check for 36.0V at the cathode of Diode DB1. If the 36.0V is missing, check Diode DB1 by substitution. If the 36.0V is present, check for 24.0V at Test Point VP and for 5.0V either side of Coil L2. If any of these voltages are missing, check the Regulator (IC1) by substitution. Check Diodes ZD1 and ZD2 and check voltages and components associated with 5V Regulator Transistors (Q1 and Q2) and Driver Transistor (Q3).

MICROPROCESSOR CHIP OPERATION

Check for 5.0V at pins 63 and 64 of Microprocessor IC (3B). If the 5.0V is missing, refer to the "Power Supply" section of this Troubleshooting guide.

Verify that the clock oscillator crystals CR-1 and CR-2 are functioning. Check the waveforms on pins 30 and 31 of IC 3B and pins 2 and 3 of Slave Microprocessor IC (9B). Check for a frequency of 10MHz at pins 30 and 31 of IC 3B and a frequency of 11MHz at pins 2 and 3 of IC 9B. If either of the oscillators are not functioning, check the components associated with pins 30 and 31 of IC 3B and pins 2 and 3 of IC 9B. Also, check the IC associated with the oscillator malfunctioning by substitution.

PRINthead

Printhead (HD) is moving back and forth but not printing. Check for 24.0V at Test Point VP and also check for 24.0V at pins 14, 15 and 16 of Connector CN5 as well as the collectors of each of the Driver Transistors (Q6 thru Q14). If the 24.0V is missing, refer to the "Power Supply" section of this Troubleshooting guide. If the 24.0V is correct, check for pulses at pin 36 of Microprocessor IC (3B) while printing. If the pulses at pin 36 of IC 3B are missing, check IC 3B by substitution. If pulses are present, check voltages and logic readings on Tri-State Inverter IC (1B). Also, check for pulses at pins 10 thru 16 of IC 1B and pins 11 and 16 of Tri-State Inverter IC (2C). If pulses are missing, check pulses at IC 3B, pins 1 thru 8 and pin 16. If pulses are missing, check IC 3B by substitution. If the pulses appear at pins 1 thru 8 and pin 16 of IC 3B and are missing at pins 10 thru 16 of IC 1B, check for 5.0V at pin 9 of IC 1B and check IC 1B by substitution. If pulses are missing at pins 11 and 16 of IC 2C, check IC 2C by substitution.

If one or more pins in Printhead are not functioning, check for the waveform shown in Figure 3 at the collector of the Transistors (Q6 thru Q14) driving the defective pin. Check the collector waveforms while printing. See the following table to find proper transistor driving the applicable solenoid.

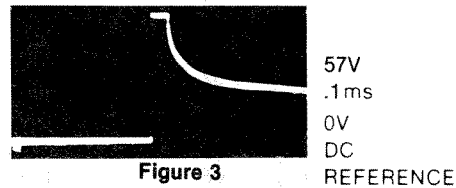


Figure 3

Transistor No.	Q11	Q10	Q13	Q9	Q14	Q7	Q8	Q12	Q6
Solenoid No.	1	2	3	4	5	6	7	8	9

If the collector of the driving transistor has a good waveform, check Printhead for a possible damaged pin or bad solenoid. If the collector waveform is missing, check for the waveform shown in Figure 4 at the base of the proper driver transistor when printing. If the base waveform is good, check the driver transistor. Also, check for open solenoid coil in Printhead or a broken connection on the flat cable connector of Printhead. If the base waveform is missing, check the related pin on the IC driving that transistor and check the IC by substitution.

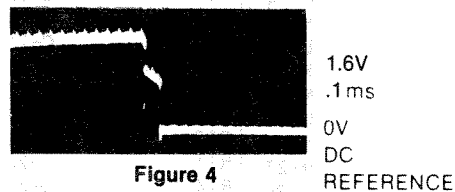


Figure 4

CARRIAGE (TIMING BELT) MOTOR

Carriage (Timing Belt) Motor Assembly (M3) does not move the Printhead back and forth. Check the operation of the HP (Home Position) Sensor (M1) and the PTS (Position Timing Signal) Sensor (M2). Check the Sensor (M1) by monitoring the Logic reading at TP Home while moving the head manually from home position and back to home position. The Logic reading should be Low when the Printhead is in the home position, and be High when the Printhead is away from home position. If the probe reading is incorrect, check components associated with pins 1 and 2 of Inverter IC (8A) and check IC 8A by substitution. Check the Sensor M2 by monitoring the pulses at TP PTS using a Logic probe while manually moving the Printhead. If the pulses are missing, check the adjustment of the Sensor M2 board, check the Logic readings at pins 5, 6, and 1 and 2 of Inverter IC (7C), and check IC 7C by substitution.

If the sensor circuits are normal and the Motor M3 still does not run, check voltages and waveforms associated with pins 4, 6, 10, 11, 12 and 13 of Tri-State Inverter IC (8C). Check for 24.0V at pin 1 of Driver (IC2). Check voltages and components associated with pins 2, 4, 6 and pins 17, 13, and 15 of IC2 and check IC2 by substitution. Check the resistance of the Motor M3 windings. Check for 9.1 ohms on connector CN4 between pins 3 and 1, pins 3 and 2, pins 6 and 4, pins 6 and 5. If the resistance of the Motor M3 windings are incorrect, check the motor by substitution. If the waveforms are missing at pins 4 and 6 of IC 8C, check for 5.0V at pins 26 and 40 of Slave Microprocessor IC (9B) and also check for frequency of 11 MHz at pins 2 and 3 of IC 9B. If the frequency is incorrect, check Crystal CR2 by substitution, and also check IC 9B by substitution.

TROUBLESHOOTING (Continued)

PAPER FEED MOTOR

If the paper does not advance, check the resistance of the Paper Feed Motor (M4) windings at pins 7 thru 12 of Connector CN4. Put the Printer in Off Line mode by depressing the On Line Button. Press the FF (Form Feed) Button and check for the waveform shown in Figure 5 at pins 1, 3, 6 and 8 of Driver IC (3C). If any waveform is missing, check for the square waveform shown in Figure 6 at pins 16, 15, 10 and 9 of IC 3C and check IC 3C by substitution.



Figure 5

5.3V
2ms
0V
DC
REFERENCE

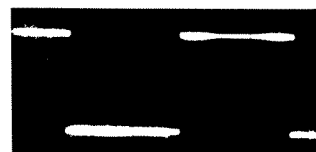
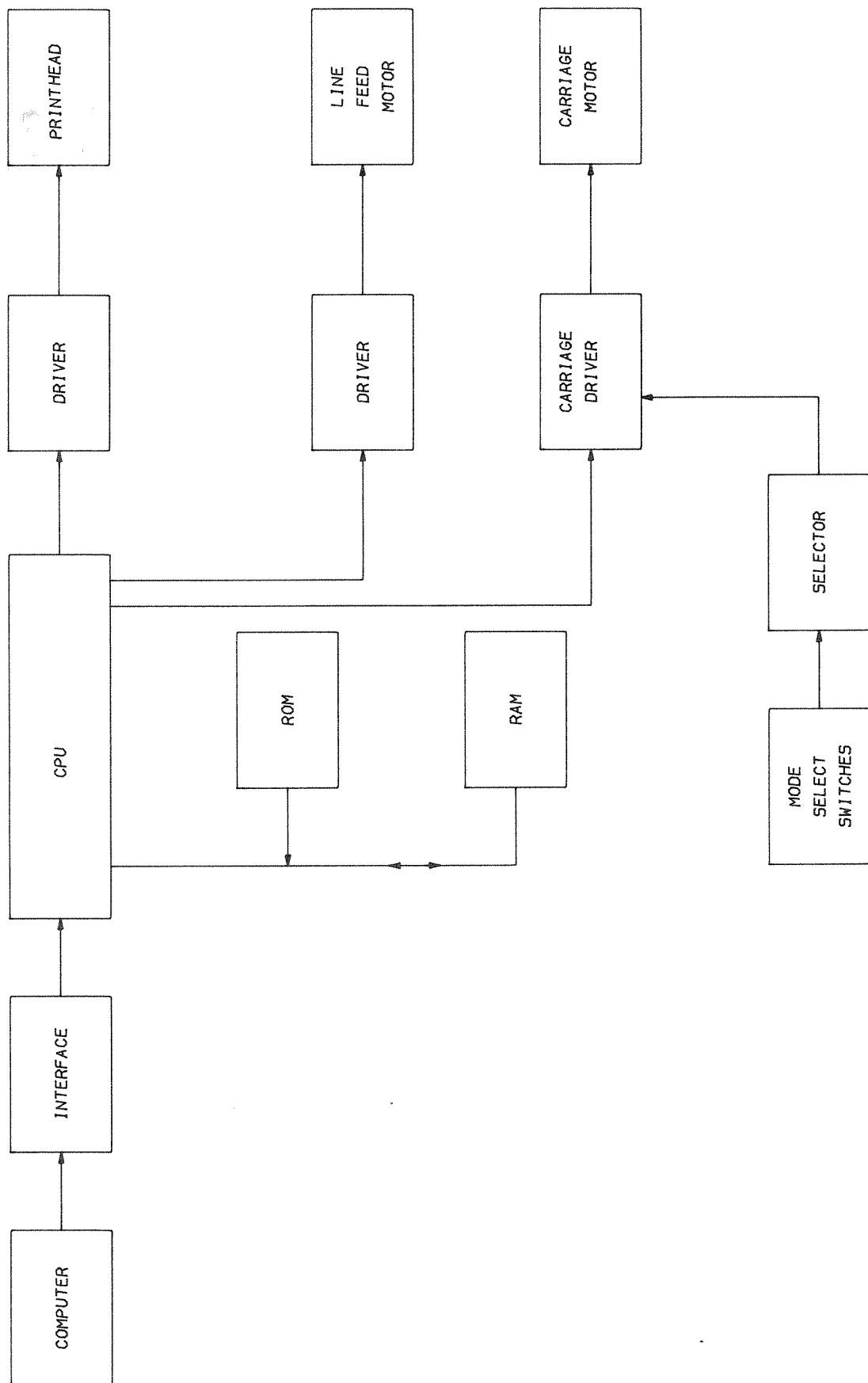


Figure 6

53V
2ms
0V
DC
REFERENCE

Check for 22.2V at the cathode of Diode D17 when the FF Button is pressed. If the 22.2V is missing, check for 24.0V at the emitter of Motor Switch Transistor (Q15). If the 24.0V is missing, check the power supply, refer to the "Power Supply" section of this Troubleshooting guide. If the 24.0V is present, check Transistor Q15 and Motor Switch Driver Transistor (Q5). Also, check Diodes D15, D16 and D17 and associated components.



BLOCK DIAGRAM

MECHANICAL PARTS LIST

REF. NO.	PART NO.	DESCRIPTION
1-1	F315002000	Frame Assembly L
1-2	F315003000	Frame Assembly R
1-3	F315053000	Base Frame Assembly
2-1	F315059000	Carriage Motor (M3)
2-2	F315058010	Carriage Motor Heat Sink
2-3	F315064000	Paper Feed Motor (M4)
3-1	F315009000	Paper End Sensor Lever Assembly
3-2	F303007020	Paper End Sensor Lever Spring
3-3	F310009020	Paper End Sensor Lever Shaft
3-6	F315010020	Paper End Sensor Lead Wire
3-8	F315061000	Print Timing Signal Sensor Lead Wire Assembly
4-1	F303014010	Timing Belt
4-2	F303017000	Belt Driving Pulley
BB	B210151490	Ball Bearing
BB	B210151690	Ball Bearing (Open Type)
4-3	F303018010	Belt Driven Pulley
BB	B210151490	Ball Bearing
BB	B210151690	Ball Bearing (Open Type)
4-4	F303018020	Belt Driven Pulley Flange
4-5	F303019000	Belt Tension Plate Assembly
4-5	F316009000	Belt Tension Plate Sub Assembly
5-1	A53J26D(1)	Printhead Assembly (5-1)
5-2	F315005000	Platen Assembly
LS	B101252490	Leaf Spring
LS	B101251490	Leaf Spring
5-3	F304004010	Platen Gear
SP	B130103216	Spring Pin
5-4	F304004020	Sprocket Plain Bearing
5-5	F315004010	Spacer (For Platen)
5-6	F315006000	Platen Sprocket Assembly Left
5-7	F315007000	Platen Sprocket Assembly Right
5-8	F304001010	Sprocket Mounting Shaft
5-9	F315018000	Carriage Assembly
5-10	F315017020	Felt Ring 168
5-11	F315017030	Felt Cap
5-12	F315021120	Head Sitting Plate
5-13	F303005010	Head Lock Lever
5-14	F303005020	Head Lock Lever Spring

REF. NO.	PART NO.	DESCRIPTION
5-15	F315017010	Head Lock Lever Shaft
5-16	F303001092	Ribbon Mask
5-17	F315021010	Carriage Shaft A
5-18	F315021020	Carriage Shaft B
5-19	F315021030	Head Adjust Lever
5-20	F315014000	Paper Holding Lever Assembly Left
5-21	F315021080	Paper Holding Lever Spring Left
5-22	F315019000	Sub Paper Holding Lever Assembly Left
5-23	F315021100	Sub Paper Holding Lever Spring
5-24	F315021140	Paper Holding Joint Shaft
5-25	F315015000	Paper Holding Lever Assembly Right
5-26	F315021090	Paper Holding Lever Spring Right
5-27	F315020000	Sub Paper Holding Lever Assembly Right
5-28	F315013010	Scale
5-29	F315016010	Paper Holding Roller Shaft
5-30	F305008020	Paper Holding Roller
6-1	F315008010	Lower Paper Guide
6-2	F315021110	Inner Paper Guide
6-24	F315062010	Paper Guide Plate
6-25	F315062020	Paper Guide Plate Spring
6-26	F315021070	Paper Feeding Reduction Gear
LS	B091050311	Leaf Spring
6-27	F315011010	Release Lever Shaft
6-28	F315021050	Sub Release Lever
6-29	F315021060	Bush for Subsidiary Release Lever
6-30	F315012010	Paper Feeding Roller Stand
6-31	F315062030	Paper Feeding Spring
6-32	F312008010	Paper Feeding Roller
6-34	F315021040	Release Lever
7-1	F303020000	Planetary Lever Assembly
7-2	F303020020	Planetary Pinion
LS	B101252190	Leaf Spring
7-3	F315052010	Ribbon Driving Gear
7-4	F315053060	Ribbon Driving Gear Shaft
8-2	A279950001	Wire Band

CP7
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EPSON

PARTS LIST AND DESCRIPTION

When ordering parts, state Model, Part Number, and Description

SEMICONDUCTORS (Select replacement transistor for best results)

ITEM No.	TYPE No.	MFR. PART No.	REPLACEMENT DATA					
			GENERAL ELECTRIC PART No.	NEW-TONE NTE PART No.	PHILIPS ECG PART No.	RCA PART No.	WORKMAN PART No.	ZENITH PART No.
D1,2 D3,4 D5 D6 thru D8	ERB4302 1S2076A 1S2075K 1S2076A	X320010380 X320010452 X320010390 X320010452	GE-511 GE-514 GE-514 GE-514	NTE552 NTE519 NTE519 NTE519	ECG552 ECG519 ECG519 ECG519	SK9000/552 SK3100/519 SK3100/519 SK3100/519	WEP172/506 WEP925/519 WEP925/519 WEP925/519	103-287 103-131 103-131 103-131
D9,10 D11,12 D13 thru D15 D16 D17	S5277B 1S2076A S5277B 1S2076A S5277B	X320010240 X320010452 X320010240 X320010452 X320010240	GE-504A GE-514 GE-504A GE-514 GE-504A	NTE116 NTE519 NTE116 NTE519 NTE116	ECG116 ECG519 ECG116 ECG519 ECG116	SK3311 SK3100/519 SK3311 SK3100/519 SK3311	WEP156 WEP925/519 WEP156 WEP925/519 WEP156	212-76-02 103-131 212-76-02 103-131 212-76-02
DB1 DM1 IC1	BA40 DRA40 uPA64H STK7554 STK7563F	X340300010 X440150640 X440755400						
IC2 M1 M2	STK6982 B1 U27 U22	X440759820 F315056000(1) EE-SJ3(2) F315060000(3) EE-SX315(2)						
Q1,2 Q3 Q4 Q5 Q6 thru Q14 Q15	2SA1015GR 2SA733 2SC1815GR 2SC945 2SD986 2SC1815Y 2SD1395 2SD1392 2SD1218 2SB794	X300101502 X302181502 X303098600 X302181502 X303121800 X301079400	GE-269 GE-48 GE-62 GE-212 GE-62	NTE290A NTE290A NTE85 NTE85 NTE85 NTE254	ECG290A ECG290A ECG85 ECG85 ECG85	SK9132 SK3114A/290A SK3124A/289A SK3124A/289A SK9370 SK3124A/289A	WEP911/290A WEP62/159* WEP66/199 WEP736/123A* WEP66/199	121-Z9003 121-Z9067 121-Z9065 121-972* 921-1309 121-Z9065 121-Z9084

PARTS LIST AND DESCRIPTION (Continued)

When ordering parts, state Model, Part Number, and Description

SEMICONDUCTORS (Select replacement transistor for best results)

ITEM No.	TYPE No.	MFR. PART No.	REPLACEMENT DATA					
			GENERAL ELECTRIC PART No.	NEW-TONE NTE PART No.	PHILIPS ECG PART No.	RCA PART No.	WORKMAN PART No.	ZENITH PART No.
Q16	2SC1815GR	X302181502	GE-62	NTE85	ECG85	SK3124A/289A	WEP66/199	121-Z9065
Q17	2SC1815Y	X302181502	GE-62	NTE85	ECG85	SK3124A/289A	WEP66/199	121-Z9065
Q18	2SC1815GR	X302181502	GE-62	NTE85	ECG85	SK3124A/289A	WEP66/199	121-Z9065
ZD1	HZ302-01	X330000522						
ZD2	HZ22-2	X330000442	GEZD-22	NTE5030A	ECG5030A	SK22A/5030A	WEP1432/5030	103-144
ZD3	HZ12B-1	X330000422						
ZD4	AU01-24	X330020020	GEZD-13	NTE5022A	ECG5022A	SK13A/5022A	WEP1424/5022	103-96
ZD5	HZ20-2	X330000492	GE5ZD-24	NTE5137A	ECG5137A	SK24X/5137A	WEP1631/5137	
	RD20EB3	X330000492	GEZD-20	NTE5029A	ECG5029A	SK20A/5029A	WEP1431/5029	103-Z9023
1B	uPA79C	X440150790	GEZD-20	NTE5029A	ECG5029A	SK20A/5029A	WEP1431/5029	103-Z9023
2A	HM6116P-4							
	uPD4016	X400040161			ECG2128			
2C	uPA79C	X440150790						
3A	HM6116P-4							
	uPD4016	X400040161						
3B	C78010BD031							
	78010BC	Y440804101						
	78010BB	Y440800702						
	7810G	Y440801001						
3C	HA13007	X400078100						
		X440170070						
4A	2764-FA4-A2	Y440800601						
	27128							
4B	TBP185030N/	Y440800101						
	M02011GA							
	M02010GA/	Y440800001						
	J245X							
	HM7603							
5A	M64100BB086/	Y440802501						
	M64100KB							
	M64100BA	Y440800701						
	M64104CA	Y441800103						
	2764-FA5-A3	Y440801101						
	2764-FC5-A3	Y441800102						
	27128							
	2364							

PARTS LIST AND DESCRIPTION (Continued)

When ordering parts, state Model, Part Number, and Description

SEMICONDUCTORS (Select replacement transistor for best results)

ITEM No.	TYPE No.	MFG. PART No.	REPLACEMENT DATA					
			GENERAL ELECTRIC PART No.	NEW-TONE NTE PART No.	PHILIPS ECG PART No.	RCA PART No.	WORKMAN PART No.	ZENITH PART No.
5B	SN74LS04N	X420300040	74LS04	NTE74LS04	ECG74LS04	SK74LS04		HE-443-755
6A	SN74LS373N	X420303730	74LS373	NTE74LS373	ECG74LS373	SK74LS373		HE-443-867
6B	MB74LS74A	X420500740	74LS74A	NTE74LS74A	ECG74LS74A	SK74LS74A		HE-443-730
7A	SN74LS373N	X420300740	74LS373	NTE74LS373	ECG74LS373	SK74LS373		HE-443-867
7B	SN74ALS32N	X420300320						
		X420500320						
7C	MB74LS04	X420300040	74LS04	NTE74LS04	ECG74LS04	SK74LS04		HE-443-755
8A	HD14584BP	X460458400						
	TC4584							
8B	HD7406P	X420100060	GE-7406	NTE7406	ECG7406	SK7406		HE-443-698
	7416	X420100160						
8C	uPA79C	X440150790						
9B	C42010EB/	Y440801301						
	MBL8042H							
	C42010EC/	Y440800102						
	8042-105							
	2716-SA2-A0	Y440800301						
	2716-SC2-A1	Y440801501						
	C642010ED/	Y440803801						
	8042-105							
	8042AH							
10A	74LS541			NTE74LS541	ECG74LS541			

(1) Assembly, includes P.C. Board.

(2) Number on unit.

(3) Assembly, includes P.C. Board and Lytic.

WIRING DATA

Shielded Hook-up Wire Use BELDEN No. 8401 or 8421 (Single-Conductor)
8208 (Two-Conductor)

General-use Unshielded Hook-up Wire Use BELDEN No. 8529 (Solid) Available in 13 Colors
8522 (Stranded) Available in 13 Colors

PARTS LIST AND DESCRIPTION (Continued)

When ordering parts, state Model, Part Number, and Description

CAPACITORS

ITEM No.	RATING	MFGR. PART No.
C1A C2A C3A C25	.1 250VAC .0047 125VAC .0047 125VAC 33 NPO 50V 5%	X221223307

ITEM No.	RATING	MFGR. PART No.
C26 C29 C30	33 NPO 50V 5% 33 NPO 50V 5% 33 NPO 50V 5%	X221223307 X221223307 X221223307

CONTROLS (All wattages 1/2 watt, or less, unless listed)

ITEM NO.	FUNCTION	RESISTANCE	MFGR. PART NO.	NOTES
VR1	Control Pulse Width	1000	X180000020	

RESISTORS (Power and Special)

ITEM No.	RATING	REPLACEMENT DATA		
		MFGR. PART No.	NEW-TONE PART No.	WORKMAN PART No.
R1 R2 R42 R46 RM1 RM2 RM3 RM5 RM6 RM7	1240 1% 1/4W Metal Film 1000 1% 1/4W Metal Film 2 5% 3W Metal Oxide 2 5% 3W Metal Oxide Resistor Network (1) Resistor Network (2) Resistor Network (3) Resistor Network (4) Resistor Network (5) Resistor Network (5)	X141411212 X141411012 X110841220 X110891220 X110843320 X110851030 X110883320 X110883320		

- (1) Contains four (4 ea) 1200 10% 1/8W.
 (2) Contains nine (9 ea) 1200 10% 1/8W.
 (3) Contains four (4 ea) 3300 10% 1/8W.
 (4) Contains five (5 ea) 10K 10% 1/8W.
 (5) Contains eight (8 ea) 3300 10% 1/8W.

TRANSFORMER (Power)

ITEM No.	RATING			REPLACEMENT DATA		
				MFGR. PART No.	THORDARSON PART No.	NOTES
	PRI.	SEC. 1	SEC. 2			
T1	120V AC @ 450mA	28V AC @ 1A DC	7.6V AC	Y440501000 CT-P04U(1)		
	SEC. 3	SEC. 4	SEC. 5			

- (1) Number on unit.
 Y440503000 (European Models using 220V AC, 50Hz power source).
 Y440504000 (European Models using 240V AC, 50Hz power source).

COILS (RF-IF)

ITEM No.	FUNCTION	MFGR. PART No.
L1 L1A	Filter Choke Line Choke	Y440201002

ITEM No.	FUNCTION	MFGR. PART No.
L2 L3	Filter Choke Filter Choke	Y310202003 Y440201002

EPSON
MODEL FX-80

PARTS LIST AND DESCRIPTION (Continued)

When ordering parts, state Model, Part Number, and Description

FUSE DEVICES

ITEM NO.	DESCRIPTION	MFR. PART NO.		NOTES
		DEVICE	HOLDER	
F1	2A @ 250V Fast Acting 80mA	X502060020 X502014020(1)		

(1) Used In European versions.

MISCELLANEOUS

ITEM No.	PART NAME	MFR. PART No.	NOTES
BZ1	Buzzer	X503000110	
CR1	Oscillator	X504002700	Ceramic, 10MHz
CR2	Oscillator	X504003400	Ceramic, 11MHz
CR3	Oscillator	X504002800	Ceramic, 61.4MHz
D96	LED		Power, Green, Part of FPEL Control Board Assembly
D97	LED		Ready, Green Part of FPEL Control Board Assembly
D98	LED		Paper Out, Red, Part of FPEL Control Board Assembly
D99	LED		On Line, Green Part of FPEL Control Board Assembly
HD	Printhead Assembly	A53J26D(1)	(5-1)
M3	Carriage Motor	F315059000	(2-1)
M4	Paper Feed Motor	F315064000	(2-3)
P1	Power Cord	Y422301001	AC, Polarized
	Power Cord	Y422303001	Ac, Polarized, European Models using 220V AC
	Power Cord	Y422304001	AC, Polarized, European Models using 240V AC
SW1	Switch	X602400580	DIP, (8 settings)
SW1A	Switch		Power, On-Off
SW2	Switch	X620400910	DIP, (4 settings)
SW4	Switch		Pushbutton, Line Feed, Part of FPEL Control Board Assembly
SW5	Switch		Pushbutton, Form Feed, Part of FPEL Control Board Assembly
SW6	Switch		Pushbutton, On Line, Part of FPEL Control Board Assembly
SW99	Switch	A170202502	Reed, Paper End (3-5)
3-4	Assembly	F315010010	Paper End Sensor Board
3-7	Assembly	F315060000	Print Timing Signal Sensor Board
3-8	Assembly	F315056000	Home Position Sensor Board
8-1	Assembly	F315054000	Terminal Board
200	P.C. Board	Y440205000	FMBD Board, with CPU socket, without LSI components
220	Assembly	Y440505000	FPEL Board (Control Board Assembly) complete
300	P.C. Board	Y440203000	Filter Board, 120V AC
400	P.C. Board	Y440203200	Filter Board, 220/240V AC, European versions

For SAFETY use only equivalent replacement part.

(1) Number on unit.

CABINET & CABINET PARTS (When ordering specify model, chassis & color)

ITEM	PART No.	ITEM	PART No.
Lower Case	Y440005001	Printer Lid	Y440004001
Base Plate	Y440006001	Printer Lid (European Version)	Y440004101
Ground Plate	Y422030001	Separator	Y440011001
Upper Case	Y440000001	Knob, Platen	Y440010001
Board Cover	Y440014001	Spring, Knob	X510360010
Interface Plug	Y440002001	Logo Plate	Y440021001
Printer Cover	Y440003001		

LOGIC

PIN NO.	IC 1	IC 2	1B	PIN NO.	2A	PIN NO.	2A	PIN NO.	2C	PIN NO.	3A	PIN NO.	3A	
1	(4)	(4)	P	1	P	13	P	1	P	1	P	13	P	
2			P	2	P	14	P	2	H	2	P	14	P	
3			P	3	P	15	P	3	P	3	P	15	P	
4			P	4	P	16	P	4	P	4	P	16	P	
5			P	5	P	17	P	5	L	5	P	17	P	
6			P	6	P	18	P	6	P	6	P	18	P	
7			P	7	P	19	P	7	H	7	P	19	P	
8			L	8	P	20	P	8	L	8	P	20	P	
9			H	9	P	21	P	9	H	9	P	21	P	
10			P	10	P	22	P	10	L	10	P	22	P	
11			P	11	P	23	P	11	P	11	P	23	P	
12			P	12	L	24	H	12	H	12	L	24	H	
13			P					13	P					
14			P					14	P					
15			P					15	L					
16			P					16	P					
PIN NO.	3B	PIN NO.	3B	PIN NO.	3B	PIN NO.	3B	PIN NO.	3C	4B	PIN NO.	5A	PIN NO.	5A
1	P	17	H	33	L	49	P	1	*(3)	P	1	H	15	P
2	P	18	H	34	*	50	P	2	P	H	2	P	16	P
3	P	19	L	35	H	51	P	3	L(3)	P	3	P	17	P
4	P	20	P	36	P	52	P	4	L	P	4	P	18	P
5	P	21	H(2)	37	H	53	P	5	L	P	5	P	19	P
6	P	22	P	38	L	54	P	6	*(3)	P	6	P	20	P
7	P	23	P	39	L	55	P	7	P	H	7	P	21	P
8	P	24	P	40	H	56	P	8	L	L	8	P	22	P
9	H	25	H	41	H	57	P	9	H(3)	H	9	P	23	P
10	H	26	L	42	H	58	P	10	L(3)	P	10	P	24	P
11	L	27	P	43	H	59	P	11	H	P	11	P	25	P
12	H	28	H	44	P	60	P	12	L	P	12	P	26	P
13	L	29	L	45	P	61	P	13	L	P	13	P	27	P
14	H	30	P	46	P	62	P	14	H	P	14	L	28	H
15	H	31	P	47	P	63	H	15	H(3)	L				
16	P	32	L	48	P	64	H	16	L(3)	H				

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NOTE: Logic probe readings taken with Printer On Line and in self-test mode unless otherwise noted. Switches SW1 and SW2 set as shown on schematic.

Logic Probe Display

L = Low

H = High

P = Probe

* = Open (No lights On)

(1) High when Printhead at home position.

(2) Low when Printhead at home position.

(3) Pulse during line feed.

(4) Logic readings not taken.

(5) Do not measure.

LOGIC (Continued)

PIN NO.	5B	6A	6B	7A	7B	7C	8A	8B	8C	PIN NO.	9B	PIN NO.	9B
1	P	L	H	H	P	P	L(1)	L	L	1	H(2)	21	P
2	P	P	L	P	P	P	H(2)	H	L	2	(5)	22	P
3	*	P	H	H	H	P	H	L	L	3	(5)	23	P
4	L	P	H	H	L	P	L	L	P	4	H	24	H
5	P	P	L	P	L	H	P	H	P	5	H	25	H
6	P	P	H	P	L	L	P	L	P	6	P	26	H
7	L	P	L	H	L	L	L	L	P	7	L	27	H
8	L	P	L(1)	H	H	P	L	L	L	8	P	28	H
9	H	P	H(2)	P	H	P	H	H	H	9	P	29	H
10	L	L	H	L	L	H	H	H	P	10	P	30	H
11	H	P	P	H	H	L	L	L	P	11	P	31	H
12	H	P	H(2)	P	H	L	L	H	P	12	P	32	L
13	L	P	H	H	L	H	H	L	P	13	P	33	L
14	H	P	H	H	H	H	H	H	H	14	P	34	L
15		P		P					H	15	P	35	L(3)
16		P		P					H	16	P	36	L
17		P		H						17	P	37	L
18		P		H						18	P	38	H
19		P		P						19	P	39	P
20		H		H						20	L	40	H

NOTE: Logic probe readings taken with printer On Line and in self-test mode unless otherwise noted. Switches SW1 and SW2 set as shown on schematic.

Logic Probe Display

L = Low

H = High

P = Pulse

* = Open (No lights On)

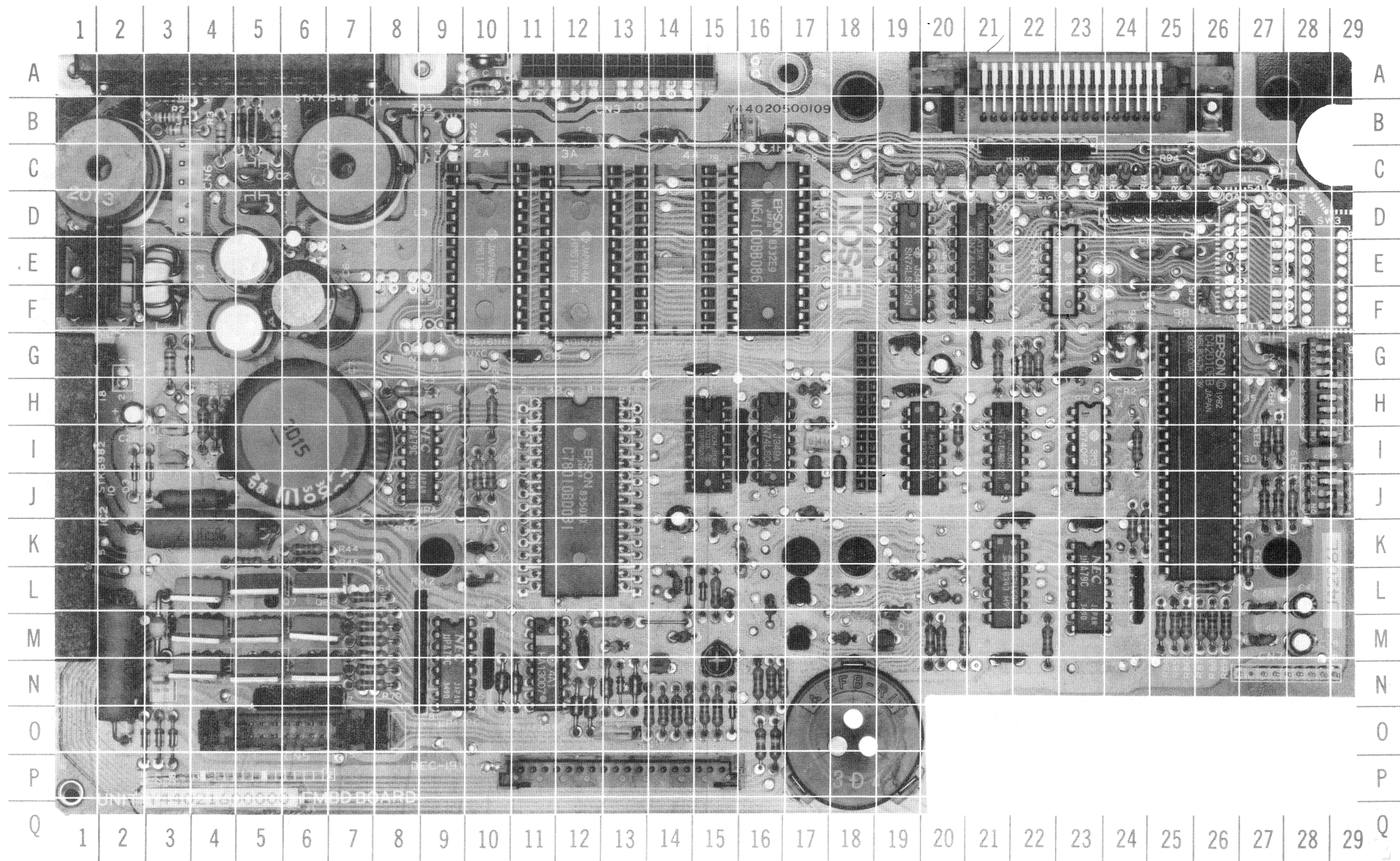
(1) Probe indicates H when Printhead is at home position.

(2) Probe indicates L when Printhead is at home position.

(3) Probe indicates P during line feed.

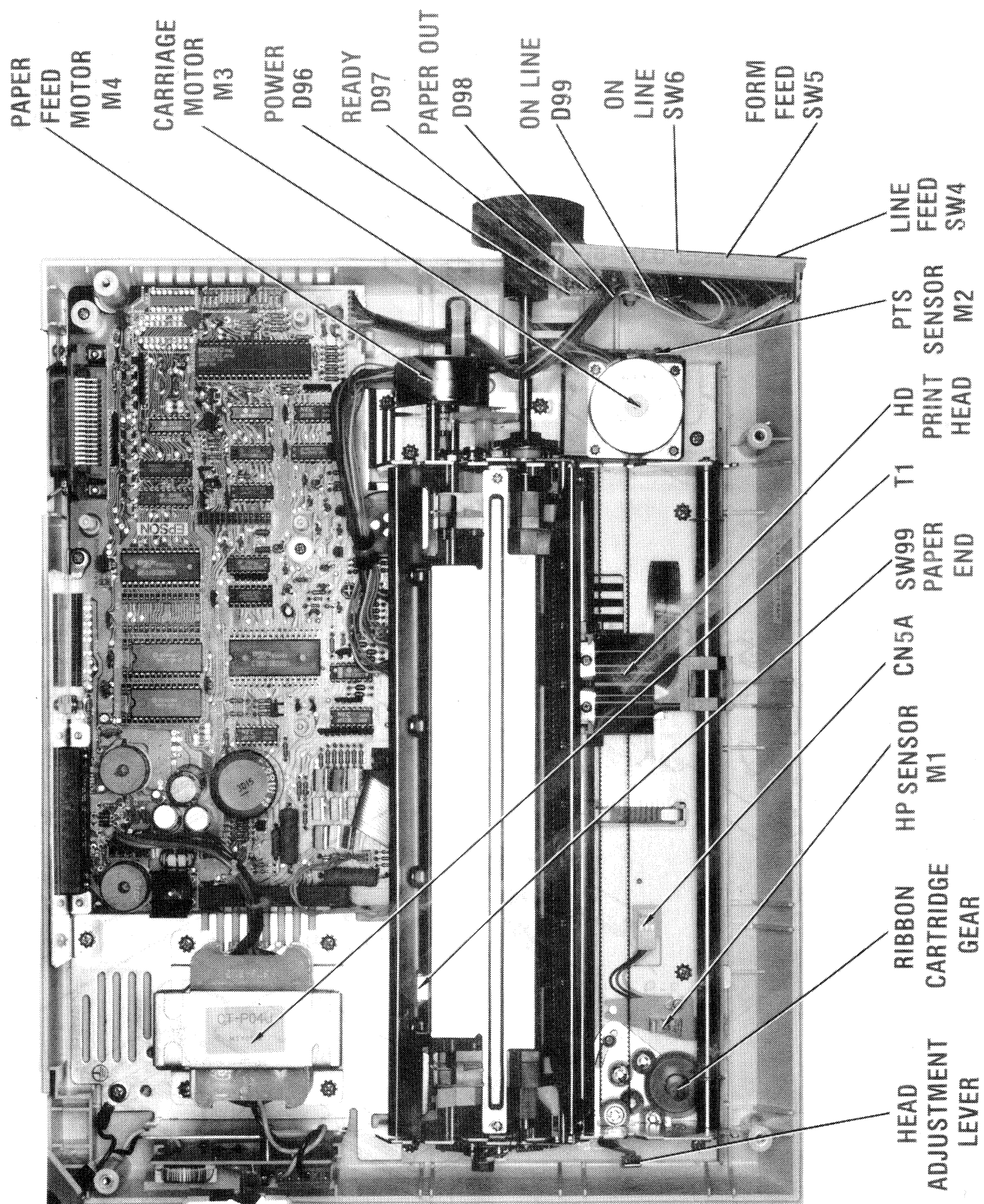
(4) Logic readings not taken.

(5) Do Not Measure.



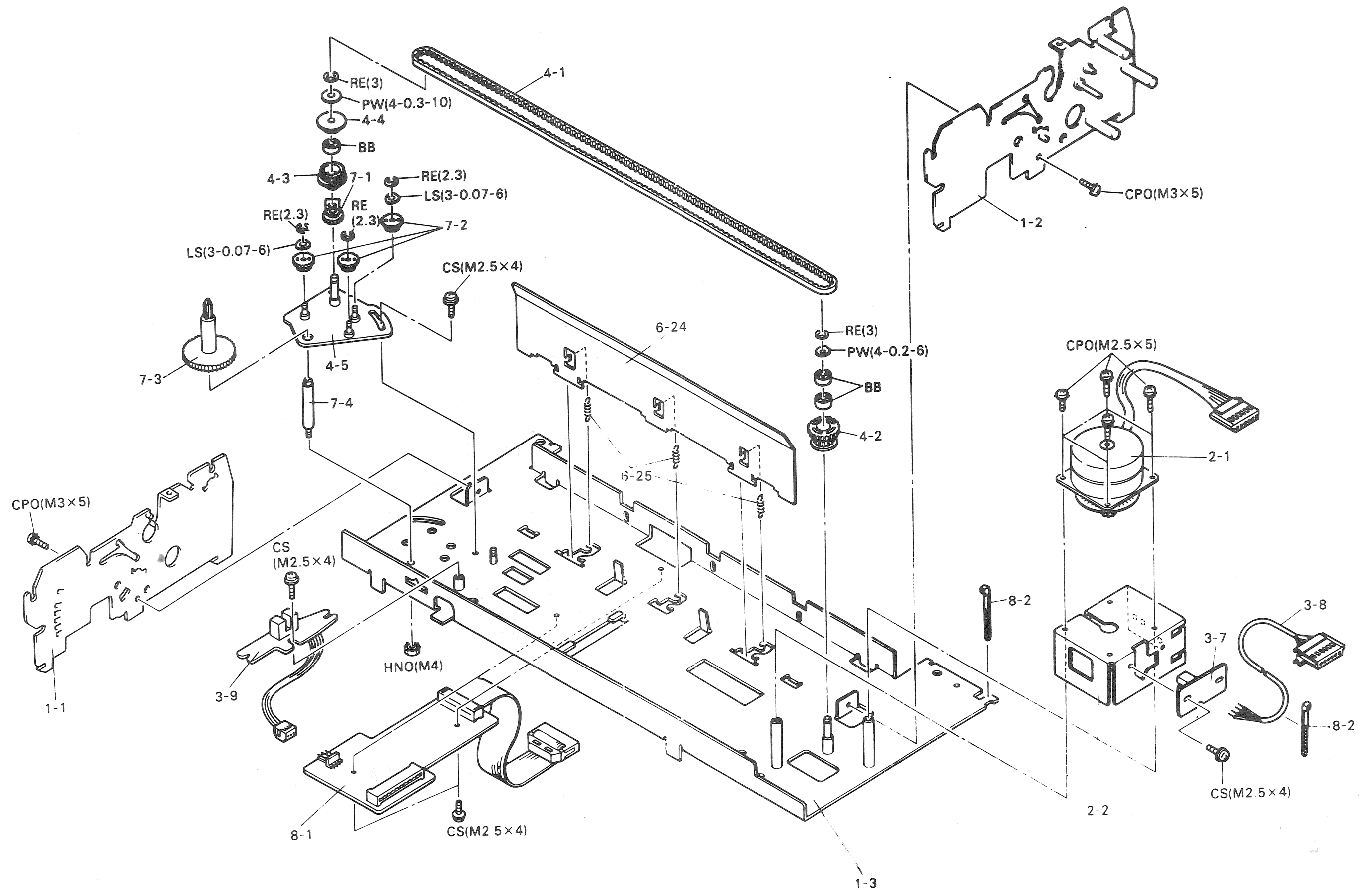
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CHASSIS-TOP VIEW



MECHANICAL REMOVAL AND REPLACEMENT

RIBBON CARTRIDGE REPLACEMENT

Slide Carriage Assembly to center. Move Scale (5-28) to uppermost position. Turn knob on replacement Ribbon Cartridge counterclockwise to tighten ribbon. Install Ribbon Cartridge with the two tabs at each end fitting into the two slots of each side frame and the cartridge seated on the Ribbon Driving Gear (7-3). Do not force it into place. Carefully slide Ribbon between Printhead (5-1) and Ribbon Mask (5-16). Slide Carriage Assembly back and forth to verify proper Ribbon movement.

PRINTHEAD/RIBBON MASK REMOVAL

Remove Platen Cover, Printer Lid and Ribbon Cartridge. If Printer has been operating, allow Printhead (5-1) to cool. Slide Carriage Assembly to the left end of Carriage Shafts to allow access to Head Cable and Head Cable Connector on the Terminal Board (8-1). Hold Connector in place and carefully remove the Head Cable from it by pulling on the plastic tab beneath the Head Cable.

Slide Carriage Assembly to the center position for access to the Head Lock Lever (5-13). Rotate the lever to the left to release the Printhead. Lift Printhead straight up to remove from Carriage Assembly.

Remove the two positioning screws holding Ribbon Mask (5-16) and lift mask from Carriage Assembly.

Reverse the procedure for replacement. See Printhead Adjustment in Miscellaneous Adjustments.

CARRIAGE MOTOR/POSITION-TIME (PTS) SENSOR REMOVAL

Remove upper case. See Disassembly Instructions. Disconnect Connector CN4 from FMBD Board. Remove left-front screw and right-rear screw from base of Carriage Motor (2-1). Lift motor assembly out of Printer base. Free the motor wire harness and separate the Carriage Motor and Position-Time Sensor wires.

Remove the screw holding the Position-Time Sensor Board (3-7) to the motor base and remove Sensor Board from Carriage Motor heat sink. Remove right-front screw and left-rear screw from the motor base to remove the Carriage Motor and Sensor Disk from the heat sink.

Reverse the procedure for replacement. See PTS Sensor Board Adjustment in Miscellaneous Adjustments.

HOME POSITION SENSOR REMOVAL

Remove Platen Cover, Printer Lid and Ribbon Cartridge. Slide Carriage Assembly to the right end of Carriage Shaft to access the Home Position Sensor Connector on the Terminal Board (8-1). Disconnect Connector and remove screw holding Sensor Board. Lift Sensor Assembly out of Printer base.

Reverse the procedure for replacement. See Home Position Sensor Adjustment in Miscellaneous Adjustments.

TIMING BELT REPLACEMENT

Remove Printer mechanism from case. See Disassembly Instructions. Press downward on the Timing Belt (4-1) at each side of the point where belt is attached to Carriage Assembly. CAUTION: Belt may be held in place with adhesive cement. If removal is difficult, slide the Carriage Assembly to the right and over the access hole in the chassis base. Turn the chassis over. Carefully cut the adhesive seal with a razor blade and remove the belt from the Carriage Assembly with needle-nose pliers.

Loosen the screw securing the Belt Tension Plate (4-5) and remove the Timing Belt from the belt-driven pulley. Remove the left-front screw and right-rear screw from the Carriage Motor (2-1). Lift the motor assembly from the Printer base for access to the belt drive pulley. Remove belt from pulley. Push belt through opening in right frame and remove belt from Printer.

Install replacement by reversing the removal procedure. Before adjusting tension, apply a drop of adhesive cement where Timing Belt is attached to Carriage Assembly and allow to dry. See Timing Belt Adjustment in Miscellaneous Adjustments.

BELT TENSION PLATE REMOVAL

Remove upper case. See Disassembly Instructions. Slide Carriage Assembly all the way to the right. Loosen the nut on each end of the front Carriage Shaft (5-17). Remove the left end of the Carriage Shaft from the side frame. Remove the adjustment screw from the Belt Tension Plate (4-5) and lift the Timing Belt (4-1) from the belt-driven pulley. Lift the Tension Plate up and out of the Printer base with ribbon driving gears intact.

Reverse the procedure for replacement. See Timing Belt Adjustment in Miscellaneous Adjustments.

PAPER FEED MOTOR/TRANSMISSION GEAR REMOVAL

Remove upper case. See Disassembly Instructions. Disconnect Connector CN4 from FMBD Board. Remove three screws from base of Paper Feed Motor (2-3). Remove motor from chassis side frame. Free the motor wire harness and separate Paper Feed Motor wires from harness. Pull Transmission Gear (5-3) straight out from side frame and off of gear shaft pin. Retain thrust washer used on inner side of gear.

Reverse the procedure for replacement. Slide motor up to minimize gear lash but do not lock up gears. Perform self-test to check proper paper advancement.

SCALE/PAPER HOLDING LEVERS REMOVAL

Remove upper case. See Disassembly Instructions. Remove two screws holding Platen Cover (6-2). Carefully lift cover backward and upward to clear the lever on the Paper Empty Sensor. Loosen the screws at the end of the Scale (5-28). Remove the E-rings and Springs (5-23) from the Paper

MECHANICAL REMOVAL AND REPLACEMENT (Continued)

Holding Lever Assembly. Lift up the Scale and Paper Holding Levers to remove them from the side frames. Keep the two Lever Springs (5-21) (5-26) released at this point with the assembly. Reassemble in reverse order.

FRICTION/SPROCKET PLATEN REMOVAL

Perform Paper Feed Motor/Transmission Gear Removal and Scale/Paper Holding Levers Removal procedures. Remove the nuts on the ends of the Sprocket Guide Shaft (5-3). Remove the E-ring from the left shaft end of the Platen Assembly (5-2). This will release the Left Bearing (5-4), flat washer and thrust washer. Push the Left Bearing outward and slide the Platen Assembly toward the right. When bearings are clear of side frames, lift Platen Assembly out of chassis.

To remove Left Sprocket Assembly (5-6), slide the assembly off the left end of the Platen Assembly and Sprocket Guide Shafts. To remove Right Sprocket Assembly (5-7), remove the Spring Pin (SP) holding the Platen Gear (5-3), plain

washer, leaf spring, Spacer (5-5) and Right Bearing (5-4). Slide the assembly off the right end of the Platen Assembly and Sprocket Guide Shafts.

TRACTOR REMOVAL

Remove seven screws holding tractor to cabinet bottom. Disconnect Connectors CN4, CN5 and CN8 from FMBD Board. Lift tractor assembly from cabinet bottom.

PAPER EMPTY SENSOR REMOVAL

Remove upper case. See Disassembly Instructions. Disconnect Connector CN8 from the FMBD Board and free wires from restraining hook next to Sensor. Release Spring (3-2) and carefully bend back the holding tab at lower edge of Sensor board. Lift board from the Paper Guide Assembly. To remove the Sensor Lever (3-1), remove the E-ring and Shaft (3-3) from the lever. Reassemble in reverse order.

GENERAL OPERATION

BUZZER TONE CHECKS

Switch Printer On and listen for one of the following patterns of tones: Three short tones and one long tone will indicate an overvoltage detection. Refer to "Power Supply" section of the Troubleshooting guide.

Three short tones repeated twice indicates a Printhead (HD) malfunction. Check to see if the head cable is loose or the Printhead is not seated firmly on the carriage assembly.

Four long tones indicates one or more of the Printhead Driver Transistors (Q6 Thru Q14) is shorted, or Printhead is damaged. Replace and inspect again.

Five short tones repeated five times indicates paper empty signal. If this signal sounds when the Printer is loaded with paper, check to see if paper is inserted correctly between the lever and switch of PE sensor.

EPSON
MODEL FX-80

DISASSEMBLY INSTRUCTIONS

UPPER CASE REMOVAL

Remove the brown plastic platen cover, the paper separator, the Printer lid, and the ribbon cartridge. Remove the paper feed knob and four screws from cabinet top. Lift cabinet top up and lay it over to the right side being careful not to dislodge the control panel connector.

CONTROL PANEL REMOVAL

Disconnect Connector CN7 from the FMBD board. Release two plastic clips holding Control panel to cabinet top and remove Control panel through cabinet top.

FILTER BOARD REMOVAL

Disconnect Power Transformer Connector CN1 from Filter board. Remove one screw holding board at the center. Re-

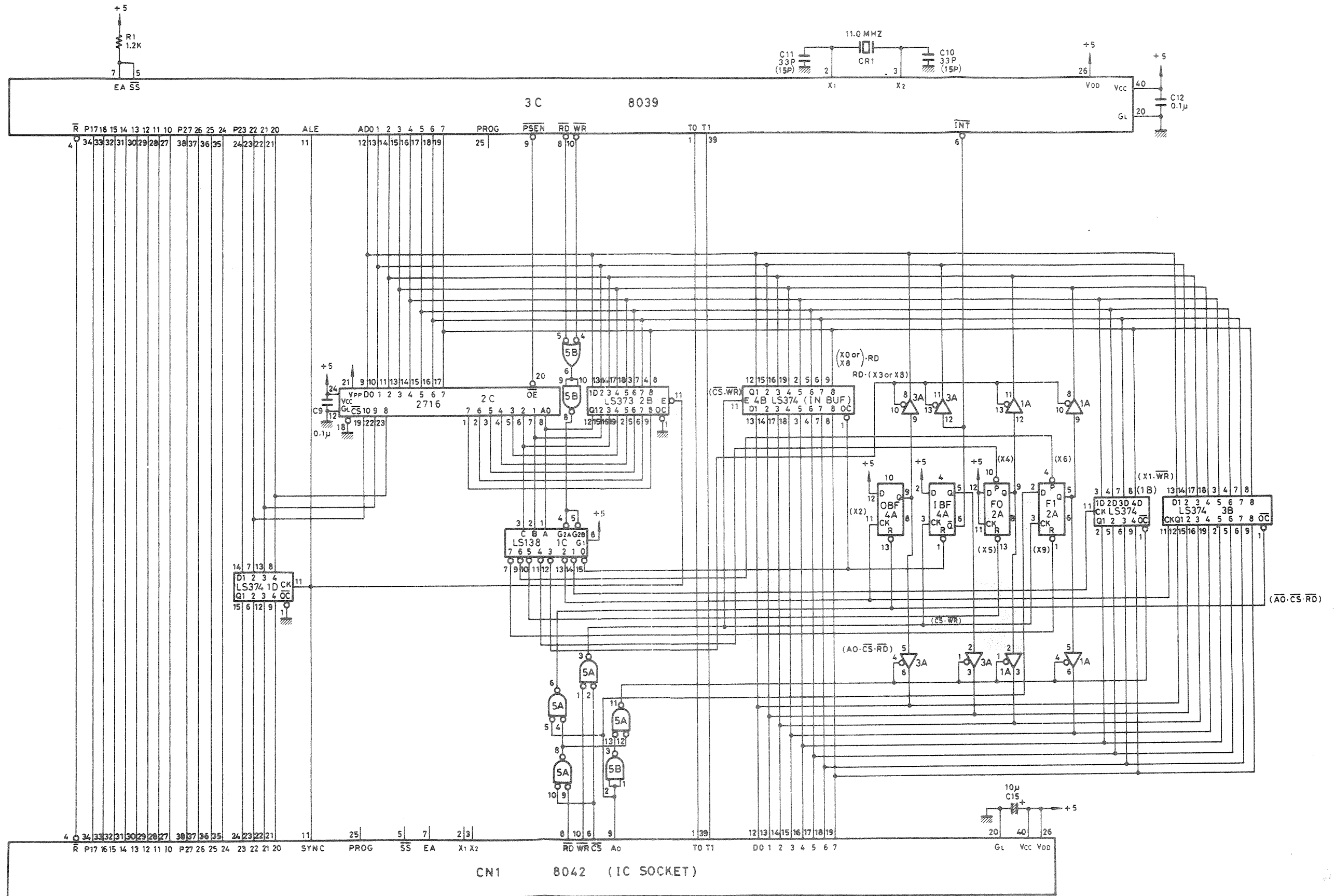
move one grounding screw (for AC power cord) from chassis. Lift Filter board and power cord retainer from cabinet bottom.

FMBD BOARD REMOVAL

Disconnect all connectors from FMBD Board. Remove four screws holding FMBD board to cabinet bottom. Release two plastic clips and remove board from cabinet.

PRINTER MECHANISM REMOVAL

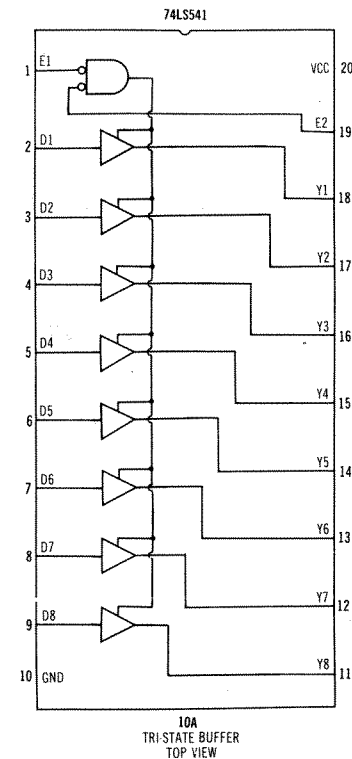
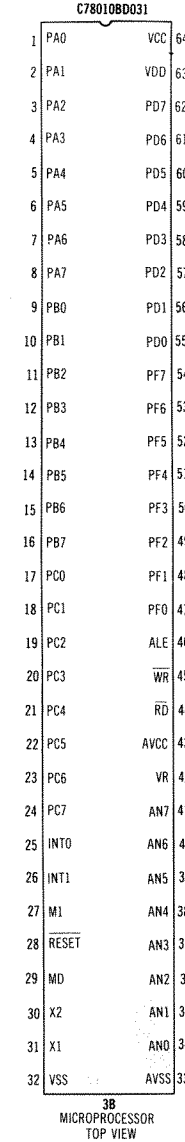
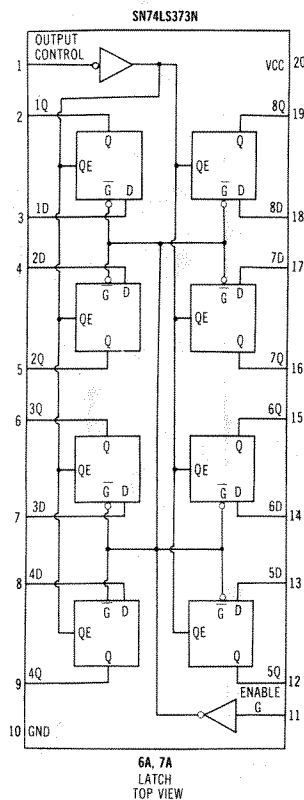
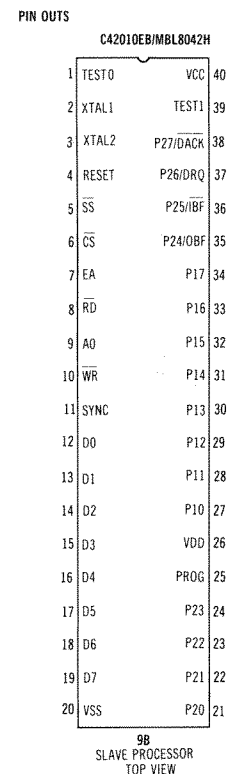
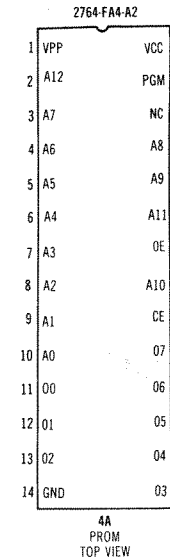
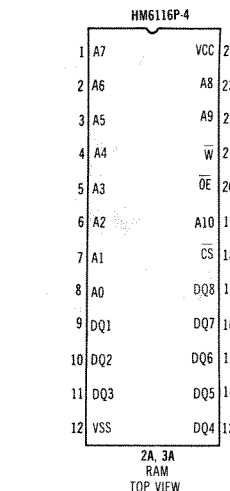
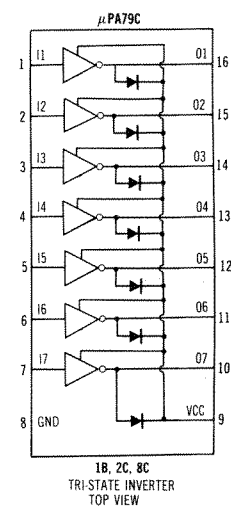
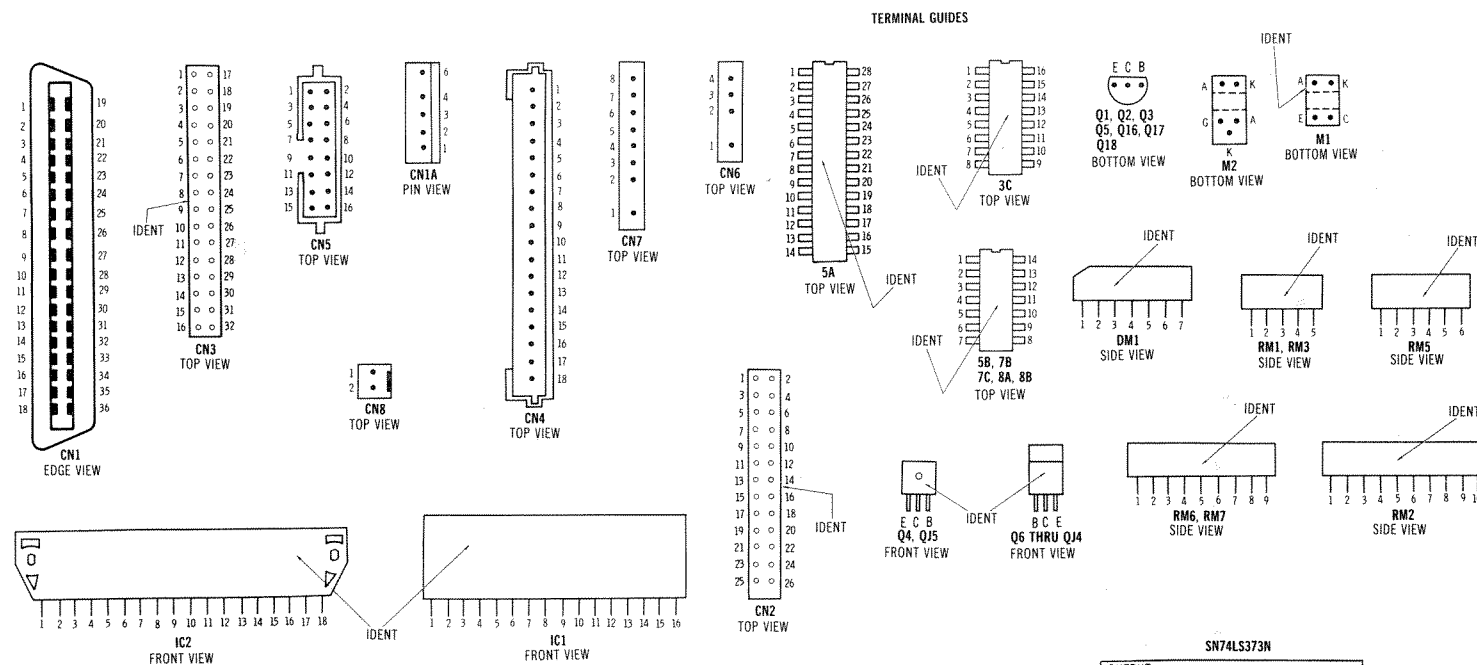
Remove seven screws holding Printer Mechanism to cabinet bottom. Disconnect Connectors CN4, CN5 and CN8 from FMBD Board. Lift Printer Mechanism from cabinet bottom.



NOTE: SUMI BOARD USED IN MODELS WITH
SERIAL NUMBERS 310001 TO 313035



IC PINOUTS, TERMINAL GUIDES AND SCHEMATIC NOTES



SCHEMATIC NOTES

- Circuitry not used in some versions
- Circuitry used in some versions
- See parts list
- ⊕ Ground

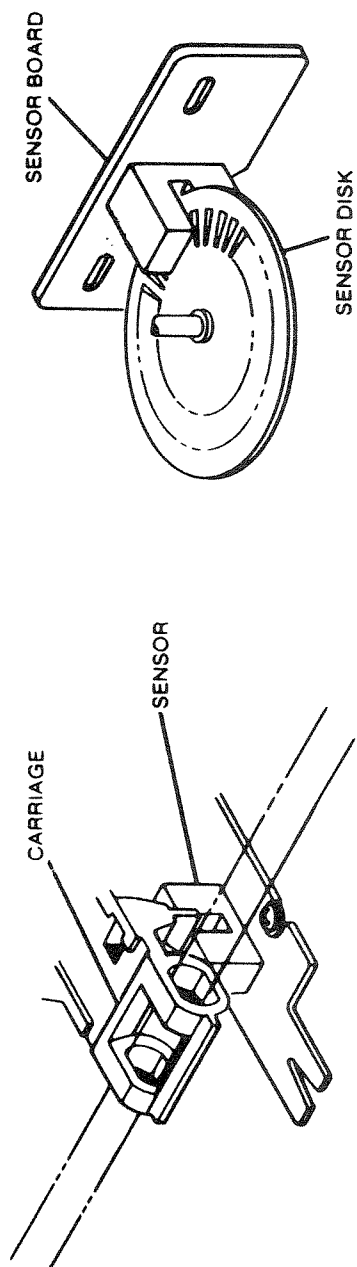
Voltages measured with digital meter.
Waveforms and voltages are taken from ground, unless noted otherwise.
Voltages, waveforms and logic readings taken with printer On Line and in self-test mode unless otherwise noted.
Switches SW1 and SW2 set as shown on schematic.
Waveforms taken with triggered scope and Sweep/Time switch in Calibrate position, scope input set for DC coupling on "0" reference voltage waveforms. Switch to AC input to view waveforms after DC reference is measured when necessary. Each waveform is 7.5cm width with DC reference voltage given at the bottom line of

each waveform. Time in μ s per cm, given with p-p reading at the end of each waveform.
Item numbers in rectangles appear in the alignment/adjustment instructions.
Supply voltage maintained as shown at input.
Controls adjusted for normal operation.
Terminal identification may not be found on unit.
Resistors are $\frac{1}{2}$ W or less, 5% unless noted.
Value in () used in some versions.

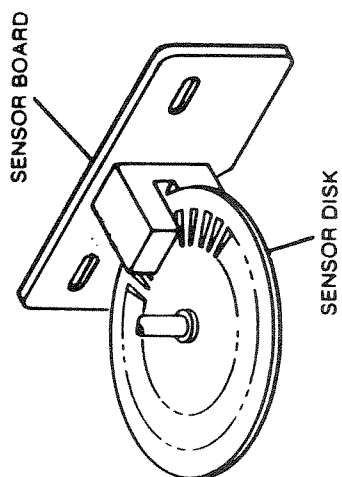
NOTE: Logic probe readings taken with printer On Line and in self-test mode unless otherwise noted. Switches SW1 and SW2 set as shown on schematic.

Logic Probe Display
L = Low
H = High
P = Pulse
* = Open (No lights On)

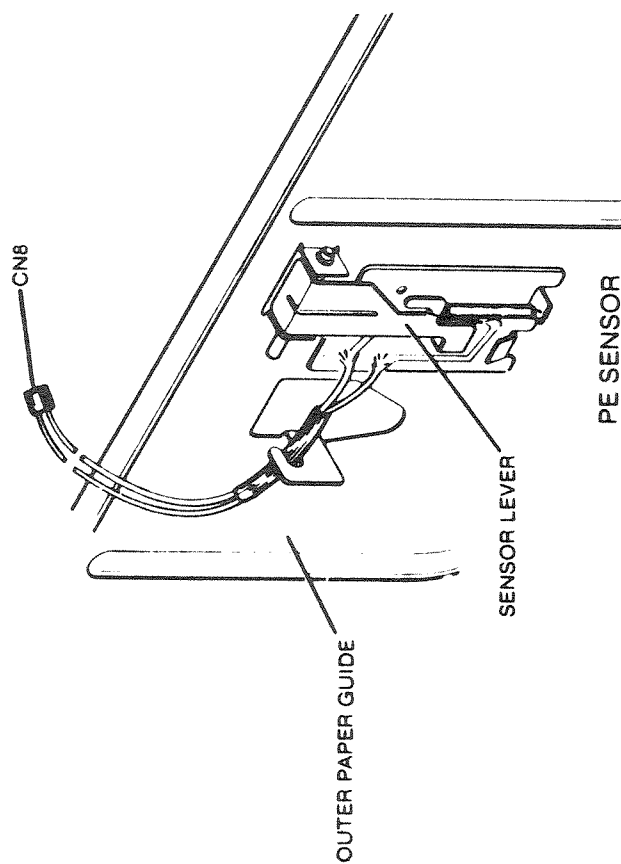
- (1) Probe indicates H when printhead is at home position.
- (2) Probe indicates L when printhead is at home position.
- (3) Probe indicates P during line feed.
- (4) Logic readings not taken.
- (5) Do Not Measure.



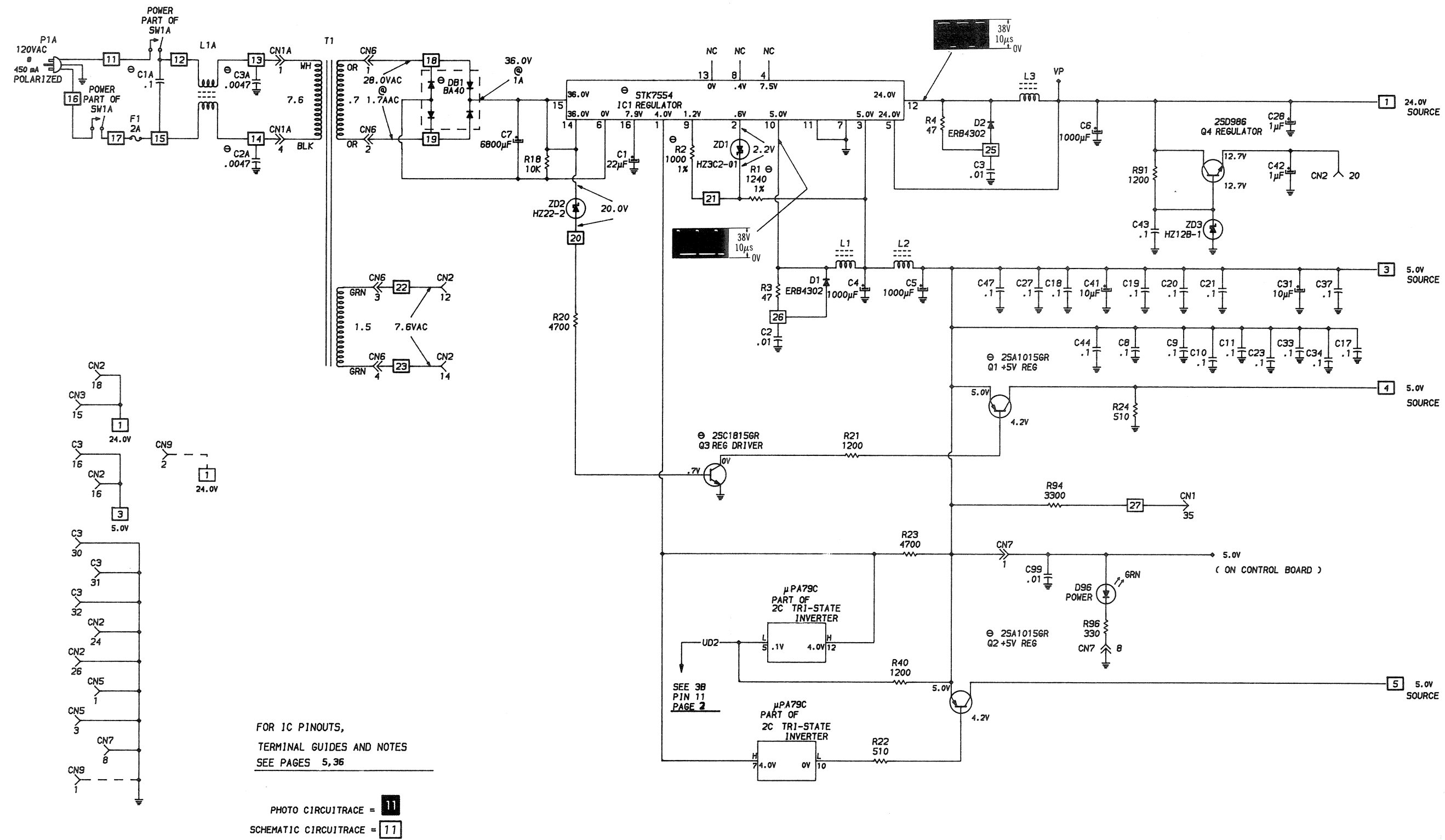
HP SENSOR



PTS SENSOR



EPSON
MODEL FX-80



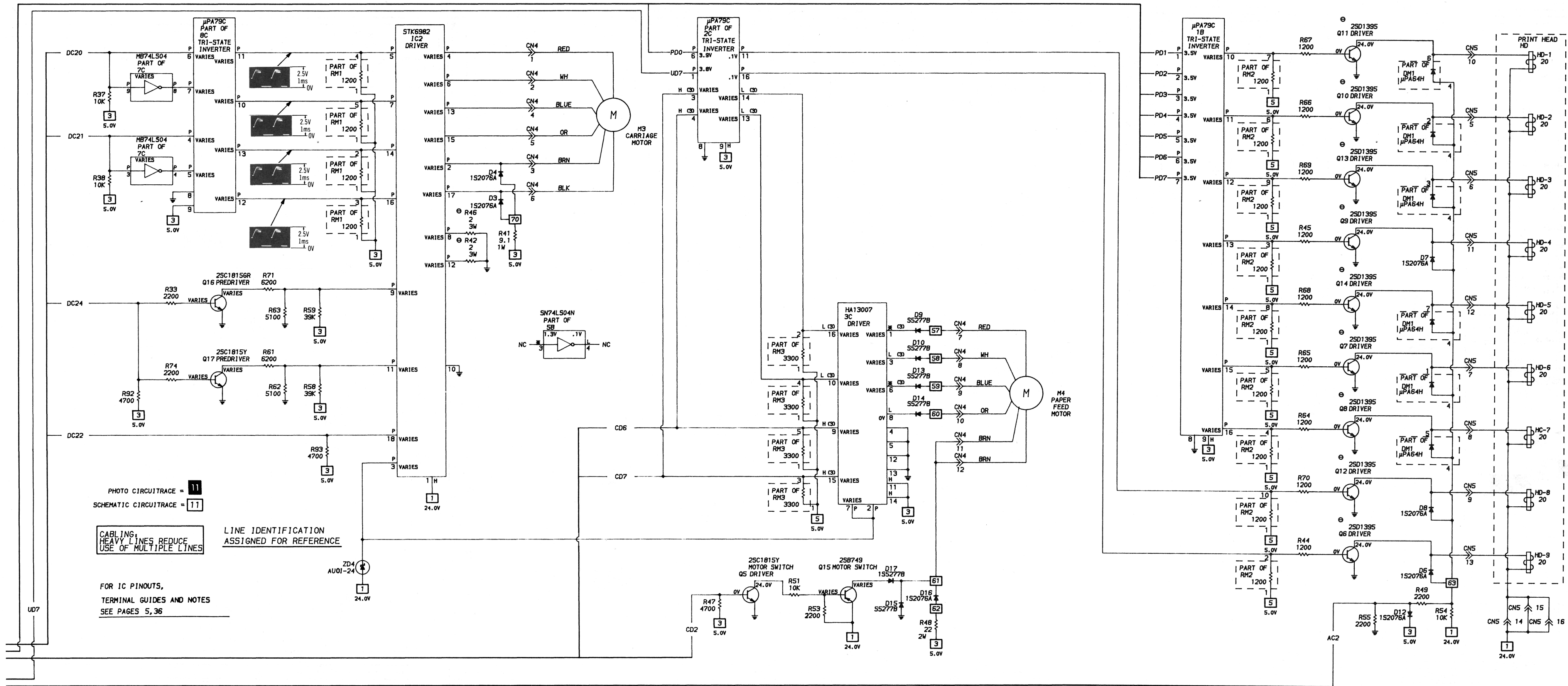
A PHOTOFACIT STANDARD NOTATION SCHEMATIC

WITH **CIRCUITRACE**

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POWER SUPPLY

POWER SUPPLY



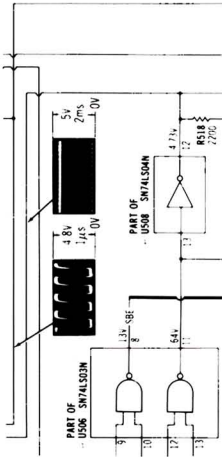


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- SAMS famous industry accepted standardized notation schematics containing CIRCUITRACE®, GRIDTRACE™, waveforms, voltages and stage identification.

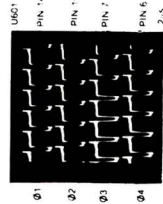


- Step by Step Troubleshooting guides the technician through the necessary procedures to quickly locate the problem.

TROUBLESHOOTING

MICROPROCESSOR CHIP (CPU) OPERATION

Verify the processor is functioning by checking the signals on the address lines D15 to D19, D24 or C16000, and the data lines D15 to D19, D24 or C16000. A logic probe or logic analyzer should be used to verify the signals. Readings of a logic probe should be similar to Figure 1. The waveforms on the data lines should be similar to Figure 2.



- Complete Components Parts List in an easy to use format with field replacements shown when possible. SAMS unique semiconductor, chip and IC cross-reference gives you many replacements to choose from and is available at your Electronic Distributor.

SEMICONDUCTORS (Select replacement for best results)

ITEM No	TYPE No	MFR PART No	REPLACEMENT DATA			
			GENERAL ELECTRIC PART No	MOTOROLA PART No	NTE PART No	WORKMAN PART No
0102	15553	1145-2576	EC5519	1N4935	NTE519	4N925/519
0103	1145-2576	1145-2576	EC5519	1N4935	NTE519	4N925/519
0201	1N4004GP	1201-4205	EC5516	1N4004	NTE116	4N925/519
0503	15553	1145-2576	EC5519	1N4935	NTE519	4N925/519

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CP7
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- Logic Chart containing logic probe readings to isolate defective circuitry and components.

LOGIC

PIN NO.	IC U100	PIN NO.	IC U100	PIN NO.	IC U100	IC U101	IC U102	IC U103	IC U104	IC U105	IC U106	IC U107	IC U108	IC U109
1	P	21	P	1	P	L	L	L	L	L	L	L	L	L
2	P	22	P	2	P	L	L	L	L	L	L	L	L	L
3	P	23	P	3	P	L	L	L	L	L	L	L	L	L

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